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Editorial: Memorial Tribute to Col. Roy D. Halloran
Winfred Overholser, M. D.

VOLUME FIFTEEN, NUMBER ONE, JANUARY-MARCH, 1954

Foreword

With this current issue of the new combined JOURNAL OF CLINICAL AND EXPERIMENTAL PSYCHOPATHOLOGY AND QUARTERLY REVIEW OF PSYCHIATRY and NEUROLOGY, we launch a new publication which will harmoniously integrate the best features of what, up to now, were two different journals.

Under the direction of Doctor Winfred Overholser, Editor in Chief of the QUARTERLY REVIEW OF PSYCHIATRY AND NEUROLOGY, and Doctor Arthur M. Sackler, Editor in Chief of the JOURNAL OF CLINICAL AND EXPERIMENTAL PSYCHOPATHOLOGY, the contents of the new journal will be made up of original papers, devoted to clinical and experimental research in psychiatry and neurology, and other medical problems that are being published in journals throughout the world.

The enlarged scope of the combined journal will present our readers with a complete panoramic view of the current developments and trends in the field of psychiatry and neurology. At the same time, through advanced clinical reports reviewing psychiatric and neurologic progress here and abroad, the reader will be informed of all facts of practical interest, related to the daily problems of their profession, and also will receive a comprehensive indication of what the horizons of the Psychiatry of Tomorrow will be, as they are outlined in today's research.

The JOURNAL OF CLINICAL AND EXPERIMENTAL PSYCHOPATHOLOGY and QUARTERLY REVIEW OF PSYCHIATRY AND NEUROLOGY welcomes the cooperation and contributions of all psychiatrists and neurologists interested in the progress of their specialties. With their aid, we hope to continue improving this journal in order to make it a practical, informative, and timely addition to the basic readings for all psychiatrists and neurologists.

JOURNAL OF CLINICAL AND EXPERIMENTAL PSYCHOPATHOLOGY

&

QUARTERLY REVIEW OF PSYCHIATRY AND NEUROLOGY

*

VOLUME XV, NUMBER 1, JANUARY-MARCH, 1954

JOURNAL OF CLINICAL AND EXPERIMENTAL PSYCHOPATHOLOGY

ARTHUR M. SACKLER, M.D.—*Editor in Chief*
Director, Research Division, The Creedmoor Institute for Psychobiologic Studies

*

QUARTERLY REVIEW OF PSYCHIATRY AND NEUROLOGY

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ARTHUR M. SACKLER, M.D.—*Editor-in-Chief*
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JOURNAL OF CLINICAL AND EXPERIMENTAL PSYCHOPATHOLOGY

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All manuscripts submitted for publication in JOURNAL OF CLINICAL AND EXPERIMENTAL PSYCHOPATHOLOGY AND QUARTERLY REVIEW OF PSYCHIATRY AND NEUROLOGY should be sent to Dr. Félix Martí-Ibáñez, 30 East 60th Street, New York, N. Y. Manuscripts should not include data published previously and it is understood that any manuscript submitted is not being submitted elsewhere.

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Statement of Purposes

The JOURNAL OF CLINICAL AND EXPERIMENTAL PSYCHOPATHOLOGY is dedicated to the search for the fundamental factors in the etiology and pathogenesis of psychiatric disorders; to the training of an alert, progressive, and qualified psychiatric personnel; and to the stimulation and support of all phases of psychiatric service and research—biologic, chemical, psychologic, physiologic, and social.

In the pursuit of these aims, the JOURNAL OF CLINICAL AND EXPERIMENTAL PSYCHOPATHOLOGY will venture wherever the quest may lead. Its sole criterion will be the promise of an increment in the understanding of the mind's ills. It will seek, above all, to bridge national boundaries, language barriers, and the artificial demarcations of schools and trends.

The JOURNAL OF CLINICAL AND EXPERIMENTAL PSYCHOPATHOLOGY holds that there is no justification for the present discrepancy between the rich scientific technology available to psychiatry and the poverty of technics in current use in diagnosis, treatment, and research; no need for the gap between the promise of research and the paralysis of inquiry; no excuse for the lag of years between discovery and publication, demonstration and application in practice; no sound reason for the tragic chasm between the desire of the public for psychiatric education and guidance and the failure of the profession to provide the inspiration and leadership that would fully mobilize all latent potentialities. In brief, the JOURNAL OF CLINICAL AND EXPERIMENTAL PSYCHOPATHOLOGY is dedicated to the fulfillment of psychiatry as a science and a humanity devoted to the interests of all mankind.

The JOURNAL OF CLINICAL AND EXPERIMENTAL PSYCHOPATHOLOGY looks on psychiatry as an integral whole that is, in turn, an organic part of the world of science. It seeks to be not a mere sheaf of passive paper, but a dynamic organism by means of which its editorial board will endeavor to utilize every opportunity and facility in the field of human knowledge to fulfill the tasks to which it is dedicated.

JOURNAL OF CLINICAL AND EXPERIMENTAL PSYCHOPATHOLOGY
&
QUARTERLY REVIEW OF PSYCHIATRY AND NEUROLOGY

*

Trends and Progress in French Psychiatry*

Henry Ey, M.D.
PARIS, FRANCE

REFORMS IN PUBLIC PSYCHIATRIC ASSISTANCE

The pressure exerted in recent years by psychiatrists and physicians, who are on the staffs of psychiatric hospitals, has caused tremendous alterations in these hospitals. They have changed from "prisons" for the incarceration of the mentally ill to "curing centers." Ergotherapy and sociotherapy are being developed and utilized as part of the institutions' new programs. In some psychiatric hospitals, clubs have been formed that are comprised of patients, former patients, relatives, and interested charitable persons. The clubs strive to create a social life for the patients and rehabilitate them as much as is possible at this point within the institution. At our hospital in Bonneval, we furnish patients, who are club members, with material for ergotherapy, and at times we may even grant them monetary rewards. Of course, these endeavors are a part of collective psychotherapy and are aimed at rehabilitating the patient and orienting him.

During the "Journées Psychiatriques de Paris" of 1945–1947, Doctors Bernard, Bonnafe, Daumezon, Fouquet, Le Guillant, Sivadon and I launched a veritable crusade towards the reorganization and reforming of psychiatric institutions.†

Our efforts gained the support of a number of hospitals and clinics. It must be understood that French psychiatric hospitals are organized as county institutions (approximately 100 in France) and that the source of their funds is both local and national, since they also

* This paper reports the major advances and trends in psychiatry which have taken place since the end of World War II in France.

† This later received considerable attention in the article "Misère de la Psychiatrie," published in the review *Espirit* (1953).

depend on the Ministry of Health. In addition, the vast organization of Social Security, which is mandatory in France, pays a large part of the individual's hospital bill. Therefore, they are interested in shortening the duration of hospitalization in psychiatric institutions. The cost of psychiatric aid is actually very heavy. There are 20,000 hospitalized patients and psychiatric institutions are overloaded. To remedy this situation, the government decided to modernize several hospitals and that is how the institutions of Doctor Sivadon (Ville Evrard—Seine), Doctor Le Guillant (Villejuif—Seine), and mine (Bonneval—Eure and Loire) came to be the object of a movement to stimulate the use of modern psychiatric therapies.

Many of the psychiatric hospitals that were thus modernized are now functioning in their respective specialties, e.g., the one of Dr. Montassut at Villejuif (Paris) specializes in psychosomatic medicine, Dr. Brosseau's at Villejuif (Paris) specializes in "dangerous" patients, Dr. Bernard's (Lhomelet—Nord), Dr. Ueberschlag (Lannemezan—Hautes Pyrenees), Doctors Bonnafe and Mignot's (Rouen—Seine Inférieure), et cetera. Almost all the psychiatric hospitals are being restyled in the trend of the "model" institutions, and the routine of the old "asylums" is being abandoned.

Of particular note is Saint-Alban, the psychiatric hospital located in the heart of the mountains of the Massif Central (Lozère), which is supervised by Doctor Tosquelles and has become a renowned model of sociotherapy.*

A fast-growing department in psychiatric hospitals is the "Services Libres," where the mental patients—mostly of neuroses and benign psychoses—voluntarily come themselves for treatment.

All this has tended to change the methods of psychiatric assistance, and the work is being carried on by "family colonies" (departments of "Cher" and "Allier" in Paris), by post-treatment organizations (Doussinet in Clermont-Ferrand) which are still in their infancy, by dispensaries, by psychiatric services in the general hospitals, et cetera. The movement to help abnormal and mentally ill children is very active in the country under the supervision of Professor Heuyer (assisted by a number of young specialists, psychoanalysts, psychologists, and teachers) and has made important progress. Aid for delinquent children and adolescents in moral danger owes its gains to the joint efforts of certain psychiatrists, the Ministry of Justice, and especially to Mr. Chazal (Paris), a judge in a children's court. In the field of psychiatric assistance in prisons, the work of Miss Rousset (Paris) and Doctor Dublineau (Paris) is noteworthy.

SPECIALIZATION AND THE TEACHING OF PSYCHIATRY

Since 1948, a "statute of specialists" has been established in the absence of regulation for the medical specialties. According to the *Conseil de l'Ordre des Medecins*, the specialist is a physician who devotes himself *exclusively* to the practice of the specialty for which he is qualified. The qualification for *psychiatry* is also for *neuro-psychiatry*. Many of my col-

* Cf. Evolution Psychiatrique, 1952, No. 3.

leagues have protested against this qualification of psychiatry, and I also protest because I believe that psychiatry is a specialization within itself, both practically and theoretically, and, as such, is individual and should not be combined with neurology.

However, medical schools are permitted now to issue certificates in Neuro-Psychiatry. Most of the medical schools have a professor of "neuro-psychiatry": only in Paris and Strasbourg are there a professor of neurology and a professor of psychiatry. Obviously, there is a great deal of work to be done in reorganizing the teaching methods of psychiatry. The urgency of this matter can be fully comprehended when one realizes that there are only 400 "neuro-psychiatrists" in France. Actually, the study of psychiatry is so minimized in the medical curriculum that the few teachers, despite their eminent qualities, cannot compensate for this inadequacy.

THE PSYCHOANALYTIC MOVEMENT

Thirty years ago, a number of remarkable psychoanalysts (Aliendy, Borel, Cenac, Codet, Hesnard, Laforgue, Parcheminey, Pichon, et al) founded the "Société de Psychanalyse de Paris"—a group whose allegiance was to Freud. Princess Bonaparte, a member of the group, was instrumental in implanting a strong psychoanalytic movement. The "Société française de Psychanalyse" was formed in 1953 and is headed by Doctor Lagache, Professor at the Sorbonne, and Doctor Jacques Lacan. There are few doctrinal differences between the two groups. Unfortunately, neither one of these groups is composed exclusively of physicians, which confuses the situation. The "Société française de Psychanalyse" is less attached to the letter than to the spirit of Freud, while the older society remains true to the Freudian practices and traditions.

A third group, formed about the same time as the "Société de Psychanalyse de Paris" and with the same charter members, has united with the psychoanalysts—Minkowski, Gilbert Robin, J. Lacan, J. Rouart, Dublineau, Le quillant, Lagache, Tusques, Daumezon, Mrs. Favez-Boutonnier, Sivadon, myself, and others. This group truly represents the French avant-garde of psychiatry. Its purpose is to bring out into the open for comparison and discussion the differences in viewpoint between the psychoanalytic and psychiatric groups. There the two societies of Psychoanalysts meet the psychiatrists who, although not opposed to psychoanalysis, endeavor to maintain their independence of it. This group publishes a review, *L'Évolution Psychiatrique*, with E. Minkowski and myself as editors.

PSYCHOSOMATIC MEDICINE

In the nineteenth and early twentieth centuries, French medicine shone with such a brilliance that it has remained "hypnotized" by the minds and methods of such great discoverers as Pasteur, Laennec, Claude Bernard, et al. And now, a long tradition in teaching has created a medical elite, gifted with marvelous qualities but that gives practically no attention to psychologic, psychopathologic, or psychosomatic studies. The native land of Descartes has so completely separated the body from the mind that it has difficulty in uniting them again. However, some great minds have concerned themselves with the problem

of psychosomatic medicine, including Pasche, Courchet, Marty, Racamier, et al, and also internists and neuro-surgeons who lean towards this Hippocratic conception of disease.

A recent issue of *L'Evolution Psychiatrique* was devoted to psychosomatic medicine; and in the volumes on psychiatry which we are preparing for the *Encyclopédie médico-chirurgicale* the importance of psychosomatic medicine is stressed. In practice, many doctors of medicine and surgery and specialists have come to recognize the need for the consultation of a psychiatrist in certain cases, while enough true "physicians" (with a psychosomatic medicine background) are being trained at the universities.

THE NEW THERAPIES

There have been no outstanding developments in psychiatric therapies, and the methods followed are much the same as those in other countries. Extensive use has been made of the classic shock treatments (electroshock, electronarcosis, etc.), despite some opposition (notably Baruk). Carbonarcosis has come into use, and acetylcholine shock treatments have been discontinued in general. Insulin therapy is probably the most highly regarded method of treatment for advanced psychoses, though it too is not without opposition (Baruk, for example). Lobotomy is not performed in France as much as it is in the United States, and enthusiasm for this method is dying out. However, a number of successes with lobotomy have been reported by various authors (David, Daumezon, Laboucarie, Feuillet, Brousseau, et al).

As is apparent, Baruk has made himself the apostle of a systematic abstention from all the therapeutics which, according to him, injure the human being. Those who have opposed Baruk's theory in several intense discussions had no trouble in refuting him, but were unable to convince him. They argued that it is difficult to say which is worse—the treatment or the ailment—when one is confronted by a patient who has already lost or will certainly lose his mind.

The *psychotherapeutic methods* continue to gain favor. It was especially the individual psychotherapy methods that were used first in private practice and in private clinics. These methods are being applied in the treatments by many of the psychiatric hospitals, especially in the great university centers where psychoanalysts have charge of the psychotherapy of neuroses (professors Delay and Heuyer of Paris).

Group psychotherapy seems to be the only possible means of treatment in hospitals where there are large groups of the mentally ill. The "psychodrama" or "psychotheatre" is handled skillfully by the psychotherapists, especially in Paris (e.g., Pasche, Lebovici, Diatkine, et al). Also, much work is being done in several Parisian hospitals on the psychotherapy of schizophrenics.

Interest has been aroused by the new hibernation technics of Laborit and Huguenard which utilize the action of "ganglioplegia" (more exactly, neuroplegia) that blocks or disconnects the reactions of the organism—particularly the "adrenergique" system. Until now, this technic has been used very rarely (I have worked with it in collaboration with E. Berard). The action of the drugs in the phenothiazine group has been employed to "rein-

force" the *sleep cures.* A sleep very close to physiologic sleep is thus induced and maintained for 20 to 22 hours a day for approximately three or four weeks. This technic is considered quite adequate in France, and we prefer it to the comatose sleep methods of the "Dauernarkose" type performed in Switzerland.

DOCTRINAL TRENDS

Although, only a few treatises and manuals have been published recently, we can note the work of H. Baruk[2] and the volume on psychiatric vocabulary by H. Porot.[33] I am preparing, with 150 collaborators, a work on psychiatry that will appear at the end of 1954 in the *Encyclopédie Médico-chirurgicale.*

The general conceptions that have developed tend to face mental pathology with a new perspective. There has been a revival of rigid, mechanistic classic conceptions in the work of G. de Cierambault,[9] a clinician with fine perception who follows the Cartesian principle of chronic deliriums that was conceived on the basis of the phenomena of mental automatism. P. Guiraud[19] in his remarkable book, *Psychiatrie Générale,* attempted to explain—like Monakow and Mourgue did—the cerebral pathology of the psychiatric processes, by emphasizing the great role of the instinctive "pulsations" in the subcortical nervous dynamics. Inspired by the teachings of Claude and the psychopathology of Janet, I formulated an organodynamic perspective of psychiatry which explains that I consider the implanting of mental sickness into the disorganization of nervous structures and organic equilibriums, a regression of human nature to archaic forms and unconscious depths. It is in this neo-Jacksonian conception, developed to its fullest sense and concerning all psychiatric problems, that I have attempted to root out from psychiatry the old organicist mechanism and the naïvetés of the psychogenesis of mental sicknesses. Naturally, this point has aroused serious and pertinent discussions.[16]

Other psychoanalytic conceptions are defended by Lacan[22] [23] and the psychoanalytic school. The theories of J. Delay[11] and H. Baruk[3] approach my own point of view which attempts to integrate the contributions of psychoanalysis and the pathology of the unconscious in the pathology of nervous functions and to envisage mental pathology in an anthropologic aspect. In this respect, we must note that the phenomenologic movement up to now has not had a great influence on psychiatry, despite the success of the very profound works of Sartre,[35] Merleau Ponty,[27] and especially Minkowski.[29] [30]

There are among the great published works on clinics and psychopathology, those of Lagache,[24] *La Jalousie Amoureuse;* Juliette Boutonnier,[7] *L'Angoisse;* G. Deshales,[12] *Le Suicide;* Bessiere and Fursweck,[4] *L'Hypnoanalyse;* Lhermitte (*Les Hallucinations*), and Pichot[32] on tests.

As for the more important works on neurology and psychiatry, there are those of Marchand and Ajuriaguerra,[28] *Epilepsies;* Roger, Cornil, and Paillas,[34] also on epilepsy; the discussions that I organized in a meeting on "Reports on Neurology and Psychiatry;"[15] the book of J. Delay[10] on the physiopathologic aspects of the clinic and psychiatric therapeutics; the monograph of Hecaen and Ajuriaguerra[20]—*Méconnaissances et hallucinations corporelles.*

Regarding psychoanalytic viewpoint, we can cite the studies of the Princess Bonaparte;[5, 6] the book of Hesnard,[21] *L'univers morbide de la faute;* the reports of Lagache[24] and Bouvet[8] on *Le Transfert,* the second on *Le Moi dans les névroses obsessionnelles,* et cetera.

Finally, several works have been devoted to the problems of sociology, religion, esthetics, and comparative psychology. Among these are the works of Aubin[1] on *La Magie;* G. Dumas[13] on *Le Surnaturel;* Lhermitte[25] on *Les Mystiques et les Faux Mystiques;* Françoise Minkowska,[31] *Les Dessins d'enfants* and Van Gogh . . .; Fretet[18] on *L'Aliénation poétique;* Vinchon[37] *L'Art et la Folie;* and my work, *Le Surréalisme.*

To this list of recent great publications can be added the fact that *Les Annales Médico-Psychologiques, L'Encéphale, L'Evolution Psychiatrique, La Revue française de Psychanalyse,* and *Les Cahiers de Psychiatrie de Strasbourg* are a few periodicals that publish numerous original memoirs, and another important fact is that "Le Congrès Aliénistes et Neurologues de langue française" meets every year. If I stress the point that, in 1950, France organized the first World Congress of Psychiatry, perhaps I can convince everyone that the French psychiatric movement is developing toward a true renaissance.

RESUMEN

En esta revisión de la Psiquiatría francesa, que estudia el período comprendido entre el fin de la Segunda Guerra Mundial hasta el presente, el autor comienza por extudiar los progresos realizados en los servicios públicos de psiquiatría. Los cambios que han tenido lugar en las instituciones para enfermos mentales son sorprendentes en aquéllas que se han transformado de "prisiones" para enfermos mentales, en centros de tratamiento científico y curación. La ergoterapia y socioterapia, fueron combinadas como parte de los programas de los hospitales con el fin de ayudar a preparar a los pacientes en su rehabilitación. El autor es miembro de un grupo que dirige una cruzada con este fin, y sus esfuerzos han ganado el respaldo de ciertos departamentos gubernamentales y de la mayoría de los hospitales de psiquiatría, uno de los cuales, el Saint Alban, se ha hecho famoso por el uso de la socioterapia.

En contra de lo que ocurría en el pasado, que a la enseñanza de la Psiquiatría se le daba poca importancia en las Facultades de Medicina, ahora comienza a considerarse como un campo aparte, que constituye una especialidad. El movimiento psicoanalítico incluye en estos momentos la Sociedad de Psicoanálisis de París, fundada hace 30 años; la Sociedad Francesa de Psicoanálisis, grupo fundado en 1953 y, ahora, un tercer grupo compuesto de miembros de la Sociedad de Psicoanálisis de París, que se ha unido con los psicoanalistas, entre los que está incluído el autor. Este grupo representa el ala avanzada de la Psiquiatría. Su misión es confrontar, sino conciliar, los puntos de vista del psicoanalista y del psiquiatra y posee su publicación propia, *L'Evolution Psychiatrique.*

La terapia por la insulina es probablemente la forma que goza de mayor preferencia hoy en Francia, para el tratamiento de los psicóticos. La lobotomía no se practica tanto como en ciertos hospitales de los Estados Unidos de Norteamérica. Los métodos psicoterápicos continúan mereciendo el favor, incluso aunque la psicoterapia colectiva parezca ser el único tratamiento posible en los hospitales y otras instituciones donde los enfermos mentales

existen en número elevado. Se ha despertado un gran interés por las nuevas técnicas de hibernación artificial.

RESUME

Dans cette revue sur la psychiatrie française, depuis la fin de la deuxième grande guerre mondiale jusqu'à nos jours, l'auteur discute d'abord les progrès dans l'assistance à la psychiatrie publique. Les changements qui ont eu lieu dans les institutions mentales sont prodigieux en ce que ces asiles d'aliénés ne sont plus des "prisons" mais des "centres de cure" pour le malade mental. On ajoute au régime thérapeutique habituel l'ergothérapie et la sociothérapie, en vue de la réhabilitation eventuelle du malade. L'auteur est membre d'un groupe qui a lancé une croisade vers ce but, et leurs efforts ont gagné le support de certains départements governementaux et de la plupart des hôpitaux psychiatriques, notamment Saint Alban, réputé pour son emploi de la sociothérapie.

Bien que dans le passé l'enseignement de la psychiatrie ait joué un bien petit rôle dans les écoles de médecine, elle est maintenant traitée comme une spécialité. Le mouvement psychanalytique comprend maintenant la Société de Psychanalyse de Paris, fondée il y a trente ans, un autre groupe fondé en 1953, la Société Française de Psychanalyse, et tout récemment un troisième groupe composé des membres de la Société de Psychanalyse de Paris qui se sont associés aux psychanalystes—y compris l'auteur. Ce groupe représente l'avant-garde de la psychiatrie. Sa mission est de confronter, sinon concilier, les points de vue psychanalytique et psychiatrique. Ce groupe publie la revue *l'Évolution Psychiatrique*.

La thérapie par l'insuline est probablement la méthode préférée en France pour le traitement des psychotiques. On pratique peu de lobotomie en comparaison à certains hôpitaux des États-Unis. Les méthodes psychothérapeutiques continuent de gagner du terrain, bien que la psychothérapie collective semble être le seul traitement possible dans les hôpitaux et chez les autres groupes où il y a un trop grand nombre de malades mentaux. Les nouvelles techniques d'hibernation suscitent beaucoup d'intérêt en France présentement.

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Treatment for Prolonged Insulin Coma

REPORT OF FOUR CASES

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Prolonged coma is undoubtedly the most serious complication of insulin-induced coma. In this paper† clinical observations of protracted insulin coma and controlling therapeutic measures are presented together with a review of some of the pertinent literature.

Procedure for induction of insulin coma. Patients at Letterman Army Hospital receive a small initial dose of regular insulin to determine their sensitivity to the drug. If there is no contraindication to the use of the drug, they are then given gradually-increasing and zig-zagging doses six days a week until a coma is induced. Some patients have a satisfactory coma after a few doses and continue for the entire course of treatment on doses as small as 50 units. Occasionally a patient has failed to go into a satisfactory coma on this regimen until 20 or more treatments have been given. When insulin therapy was first instituted, an initial dose of 25 units was given and the dose was doubled each succeeding day until coma ensued. This proved unsatisfactory because resistance to the insulin seemed to develop, and in several patients coma could not be induced even with doses as high as 1,800 units. It was because of this that the more gradual, zigzag type of insulin administration was adopted with a maximum dose of 325 units. The patients receive their insulin between 6 a.m. and 7 a.m., and usually after seven to ten days they begin to have satisfactory comas within two hours after insulin administration.

Patients are allowed to remain in coma, depending on their general physical condition, for from 15 to 90 minutes. During this period, a medical officer, a nurse, and at least 4 male ward attendants (all with special training in this method) are constantly present. All equipment necessary to handle any anticipated emergency is kept in the insulin therapy ward at all times. This ward is kept darkened and as quiet as possible during treatment periods. A daily chart is maintained on each patient's bed on which to record all pertinent findings as well as the insulin dosage for that day. Pulse, blood pressure, and respirations are recorded at 15 minute intervals, or more often if indicated. Temperatures are recorded as indicated. The medical officer, nurse, and ward attendants constantly check each patient to determine the depth of the coma and to detect complications. Quiet music during induction proved helpful, and more lively music played during the termination period was thought to be beneficial.

Procedures for termination of insulin coma. To terminate the coma, patients are given 50 cc. of 30 per cent dextrose solution intravenously. This is repeated in from 10 to 15 minutes if they do not respond. Failure to respond to the second infusion within from 10 to 15 minutes is evidence of a refractory coma. Whole blood transfusion, 10 per cent dex-

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The opinions or assertions contained herein are the private ones of the writer and are not to be considered as official or reflecting the views of the United States Army.

trose, calcium gluconate, Ringer's solution, normal saline solution, plasma, coramine, and niacin are given intravenously as indicated; epinephrine and atropine are given intramuscularly as indicated; oxygen and carbon dioxide are given by inhalation; sponging with alcohol to keep the temperature from becoming dangerously high; and postpharyngeal and intratracheal suction are applied as needed. Close coordination with the eye, ear, nose, and throat section is maintained and bronchoscopy is used if respiratory embarrassment is present. Paraldehyde in doses of 4 cc. is given intramuscularly as needed to control the excessive muscular activity that has been a complicating factor in all our patients.

CASE REPORTS

Case 1. A 34 year old patient had chronic paranoid schizophrenia. His physical condition was good. He received 50 units of regular insulin on May 2, 1947, with no untoward reactions. On the following day he received 150 units and on May 5, 200 units with no reaction other than profuse sweating. On May 6, he received 400 units at 7 a.m. and was in a light coma by 9:30 a.m. His eyes remained open, he perspired excessively, salivation was excessive, and his respirations were shallow. He was given 0.43 mg. of atropine. For about 15 minutes, on two occasions during this coma he had generalized muscular twitching, and he vomited once. At 10:40 a.m., glucose in fruit juice was given by gavage, and he responded so slowly that he was also given 50 cc. of a 50 per cent dextrose solution intravenously. He then recovered from the coma. On May 7, the patient was given 450 units of insulin at 7 a.m. and went into a light coma at about 8:45 a.m. He was given atropine at 9 a.m. He had a grand mal convulsion at 9:15 a.m., and at 10 a.m. he was given glucose in fruit juice with great difficulty as he said it made him sick.

On May 8, the patient received 400 units of insulin, making the total dosage 1,650 units. The insulin was given at 7 a.m., and the patient went quietly into coma at 9 a.m. Routine termination of the coma by gavage at 10 a.m. was attempted, but when he failed to respond within 15 minutes he was given 40 cc. of a 50 percent dextrose solution intravenously. His temperature, pulse, respirations, and blood pressure had remained within normal limits, but at this time his pulse varied from 120 to 160 and respirations from 28 to 40. His respirations were shallow and strident. Shortly after 10:15 a.m., his temperature began to rise and reached 106 F. During the remainder of the day and night, all indicated therapy, including coramine in repeated doses, caffeine and sodium benzoate, blood plasma, whole blood transfusions, oxygen and carbon dioxide inhalations, calcium gluconate, and niacin intravenously, Ringer's solution, and dextrose in normal saline solution intravenously, was used. Medical officers were in constant attendance. He had two atypical convulsive episodes shortly after the initial gavage and continued throughout the day with aimless flail-like movements of the arms, jerkings of the feet, side to side movements of the head, and hyperventilation. During this period the use of a rebreathing bag did not seem to help. Patient's blood pressure was about 70/30 at noon and toward midafternoon it had climbed to 190/100. By evening it had dropped to 148/60. His condition gradually improved during the day, the temperature returning to about 100 F., and by 2 a.m. on May 9, he responded to vocal stimuli. He did not recognize the medical officer until 7:30 a.m. at which time he seemed definitely out of danger.

He had been in a hypoglycemic coma about 17 hours. He was given 100 mg. of niacin intravenously on four occasions during the coma with what appeared to be a definitely beneficial effect on his circulation. The motor restlessness was satisfactorily controlled with intramuscular doses of 4 cc. of paraldehyde on four occasions during the coma. The subsequent course of this patient was uneventful. He was discharged from the hospital to his wife's care several weeks later. His condition had markedly improved, and there were no physical residual effects of the prolonged coma.

Case 2. This 33 year old soldier had paranoid schizophrenia. His physical condition was good. Insulin therapy was begun on May 6, 1947, with 50 units of regular insulin. On May 7, 100 U., on May 8, 200 U., on May 9, 200 U., on May 10, 230 U., and on May 12, 250 units produced a light coma. On each of these days the coma was terminated with 500 cc. of fruit juice with glucose given by gavage. On May 13, he was given 250 units of insulin at 7 a.m.; he quietly went into a light coma at about 9 a.m. He had received a total of 1,280 units

of regular insulin. He was given 500 cc. of fruit juice with glucose by gavage at about 10:10 a.m. but failed to respond within 15 minutes and was given 50 cc. of a 50 per cent dextrose solution intravenously. Because he still did not respond, the intravenous infusion of dextrose solution was repeated along with 1 cc. of coramine and 0.5 Gm. of caffeine sodium benzoate. Respirations increased to 40 and his pulse varied from 80 to 160. His blood pressure varied from 130/70 to 200/100, and his temperature from normal to 103 F. during the day. He received calcium gluconate, oxygen inhalations, coramine, caffeine sodium benzoate, niacin, atropine, and aminophylline. At 11:45 a.m. the blood sugar was 123 mg. per 100 cc. At 1:00 p.m. 450 cc. of light yellow gastric contents was removed and replaced with 500 cc. of fruit juice with glucose. He was given 500 cc. of blood plasma at 1:10 p.m. A whole blood transfusion of 500 cc. was given at 2:30 p.m. An airway was inserted and postpharyngeal suction was used as necessary. At 7:30 p.m. he was given 0.32 mg. of scopolamine, in addition to infusions of calcium gluconate, niacin, and normal saline solution.

None of the measures used prior to 11 a.m. seemed to correct the cardiorespiratory deficiency. The plasma and whole blood were given early in the afternoon, at which time the patient showed such signs of basal ganglion involvement as cogwheel rigidity of the muscles, athetosis, choreic movements of the legs and arms, and absence of all deep reflexes. His condition had definitely improved by 5:30 p.m. at which time his respirations had dropped to 28, his pulse was 80, his blood pressure was 128/70, and he was resting quietly. By 8 p.m. he had again lapsed into a state of basal activity and restlessness, which necessitated continuation of the type of treatment described. The administration of penicillin in doses of 20,000 units every three hours was begun at 1 a.m. on May 14, to combat respiratory infection. Niacin was given intravenously at 1:30 a.m.; 1,000 cc. of 10 per cent dextrose solution in distilled water at 1:45 a.m.; a 500 cc. whole blood transfusion at 3:30 a.m. with caffeine and sodium benzoate, coramine, oxygen as indicated, and niacin at 5 a.m. After careful vigilance on the part of the staff throughout the night, the patient rallied again and by 7:45 a.m. he was much improved. He responded to pain stimuli; his reflexes were present; his eyes were open; and his general condition was good. He continued to remain restless, however, twisting and squirming in bed and aimlessly moving his arms and legs.

At 7:45 a.m., another 1,000 cc. of 10 per cent dextrose solution was given intravenously. Calcium gluconate was given intravenously at 8 a.m.; niacin at 9 a.m.; 50 cc. of a 50 per cent sorbitol solution at 11 a.m. and niacin at 1 p.m. He took sips of water and coffee at 3 p.m.; was given 500 cc. of a solution of glucose in fruit juice by gavage at 4 p.m.; and at 5 p.m. took 200 cc. of a chocolate malt preparation and milk in small sips, as well as 300 cc. of orange juice with glucose. Coramine was given at midnight and again at about 6 a.m. on May 15.

His blood pressure had remained about 130/90 throughout May 14, and his pulse and respirations had remained within normal limits. He received about 3,500 cc. of fluids that day, and at 10 p.m., except for some restlessness and occasional movements of the arms and legs, his condition seemed good. On several occasions during the day his restlessness increased to such a degree that restraint had to be applied. Intramuscular injections of paraldehyde were not given to this patient. At 6 p.m. on May 15, he was propped up comfortably in bed. He tried to shake hands with the doctor, but he would not take fluids or food in sufficient amounts by mouth, and gavage was necessary. By this time his temperature had returned to normal. By May 16, he had returned to his precomatose catatonic state.

Comment. **In reviewing these cases, it is believed that laboratory aids were of no help in determining the course of treatment. Adequate fluid balance was maintained; drugs to support the circulation were administered; and respiratory stimulants and other supportive measures were used as needed. In view of the excellent sedative effect obtained in the other patients who were given paraldehyde intramuscularly, it is believed that this drug would have been helpful in case number 2.**

Case 3. This 22 year old patient with catatonic excitement was in good physical condition. He was on the insulin ward for about 2 weeks and recovered uneventfully from five comas prior to February 14, 1949. He had received 1,275 units of regular insulin since starting treatment. The five comas had been allowed to continue for from 30 to 60 minutes and had been terminated with a 250 cc. of 50 per cent glucose in fruit juice given by gavage and 50 cc. of 25 per cent dextrose solution intravenously.

On February 14, the patient was given his usual dose of 150 units of insulin and went into coma at 7:30 a.m. After 70 minutes of coma, termination was attempted with 350 cc. of 50 per cent glucose solution plus orange juice in sufficient quantity to make 500 cc. by gavage. The patient had sonorous respirations and a sagging of the jaw was noted during coma. When the stomach tube was almost completely withdrawn he suddenly became apneic. The jaw was pulled forward to facilitate easier respiration, with no change. Manual retraction of the tongue was of no avail. An airway was introduced with no results. Artificial respiration was applied and because he had become increasingly cyanotic, oxygen was given by mask. He gradually began to breathe. Following 0.5 cc. of a 1:1,000 solution of epinephrine given intravenously, he quickly resumed his sonorous respirations and the oxygen was discontinued. Suction was used to clear the mucus from his throat and 50 cc. of 25 per cent dextrose solution was given intravenously at 9 a.m. and again at 9:25 a.m. At this time toe signs could not be elicited. Sustained ankle clonus was present bilaterally; there was no patellar clonus; and his tendon reflexes of both knees and ankles were hyperactive. Hoffman's sign was positive bilaterally; his pupils reacted to light; his eyes gradually began to move, but were not coordinated at first, and his lid and corneal reflexes were bilaterally absent. An intravenous infusion of 1,000 cc. of 5 per cent dextrose in saline solution with one ampule of Ringer-lactate solution was started in the left arm at 9:55 p.m. At this time the reflexes in the right arm were slightly hyperactive. His abdominal and cremasteric reflexes were absent.

The patient was fairly relaxed after the apneic period of about 50 seconds. He remained relaxed with shivering movements from time to time and had some resistance to passive movements that was thought to be a basal ganglion type of response. Although he would occasionally straighten his arm and exhibit a tendency toward carpopedal spasm, no extensor spasm was noted. At 10:30 a.m. his blood pressure was 106/50. At 10:45 a.m. some extensor spasm appeared. No lid or corneal reflex could be elicited. His pulse rate gradually increased to 174 associated with hyperpnea and 4 cc. of metrazol was given. The pulse was 140 a few minutes later. At 11 a.m., 50 mg. of thiamine, 100 mg. of niacin, and 100 mg. of ascorbic acid were added to the intravenous infusion. At this time there was unsustained ankle clonus on the left and sustained ankle clonus on the right. His respirations were quieter. His blood sugar was 98. At 11:15 a.m. he responded to supraorbital pain stimuli by moving his left arm. This was followed by extensor spasm with increased respiration. At 11:45 a.m. restless movements were noted in the extremities and at 12:15 p.m. there was a suggestion of corneal reflex. A whole blood transfusion was started at 1 p.m. at which time, when testing for toe signs there was a withdrawal reflex of the one leg. Later testing gave no response. At 1:45 p.m. trembling and a pilomotor skin response were noted. This was believed to be a transfusion reaction. The patient was given 0.5 cc. of a 1:1,000 solution of epinephrine subcutaneously. The transfusion was discontinued after about 100 cc. had been given, and an infusion of 5 per cent dextrose in saline solution was started in the other arm. At 2:10 p.m. the blood pressure was 150/65. Vomiting between 2 p.m. and 3 p.m. led a consultant from the ENT department to suggest suction, Trendelenberg's position, and plasma infusion. The plasma was followed by another 1,000 cc. of 5 per cent dextrose in saline solution to which 1 ampule of Ringer-lactate solution, 100 mg. of niacin, 100 mg. of ascorbic acid, and 50 mg. of thiamine were added. Oxygen had been administered nasally off and on during the day and was discontinued at this time. Up to this time the patient involuntarily urinated twice and defecated once. At 6 p.m., because of respiratory embarrassment, intratracheal aspiration every 60 to 90 minutes was started, and 100,000 units of penicillin were given every three hours. By 6:30 p.m. there was a suggestion of a positive toe sign on the left, and the patient had started moaning. The coma seemed definitely lighter. At 7:50 p.m. prehensile grasp was present. At 8:20 p.m. the patient was groaning loudly. At 9:30 p.m. another unit of plasma was given intravenously. His blood pressure was 120/80, and his axillary temperature was down to 101.6 F., whereas at 2:10 p.m. it had been 105 F. rectally. At 10:15 p.m. he was given 4 cc. of paraldehyde intramuscularly to control motor restlessness and he became quiet at 10:45 p.m.

On February 15, the patient was given penicillin at 12:15 a.m. Oxygen was administered at 2:30 a.m. for cyanosis. By 1 p.m. he had normal toe signs, and his ankle and patellar clonus had disappeared. He was given 20 mg. of desoxyn intravenously at 3:05 p.m. following which it was noted that the lid reflex was present and more active than before. By 5 p.m. the coma continued to lighten, and the patient expectorated frequently seeming to be awake but not speaking. Occasionally he appeared to be trying to form words. Restlessness and groaning were controlled later by intramuscular injections of paraldehyde and on one occasion by sodium amytal. The intravenous infusions were continued.

By the morning of February 16, the patient seemed definitely improved. During the day his position was changed frequently; pulse and respiration had stabilized; breath sounds were of good quality with no râles; and he responded with movement and vocal noises to loud stimuli. At about 3 p.m. he responded verbally to questioning for the first time, after which he returned to his precomatose catatonic state. Although at this time he was considered to have recovered from his prolonged coma, he continued to constitute a nursing problem for a few days.

Case 4. This 20 year old patient had a chronic, severe, schizophrenic reaction, manifested by auditory hallucinations, delusions, bizarre thought content, flattened and inappropriate affect, and predominant paranoid features. His physical condition was good. On February 20, 1949, he received a test dose of 25 units of regular insulin with no untoward reaction. On February 21, he received 75 and on February 22, 125 units of insulin, without coma, but on February 23, he went into coma following 175 units. From February 23, to March 21, he continued to respond with good comas that were frequently deep enough to induce clonus, toe signs, and generalized tremors shortly before termination. The dose of insulin in this period was stabilized at 175 units except for seven days when the patient received 200 units. He was always somewhat difficult to bring out of coma, occasionally needing two intravenous injections of 30 cc. of a 25 per cent dextrose solution but always responding well to the second, becoming very excited and restless as he awakened. Prior to March 21, he had received 25 insulin treatments with 22 good comas from a total dosage of 4,125 units of insulin.

On March 21, he resisted coming into the insulin treatment room; this was unusual. He received the usual dose of insulin at 6 a.m. and went into coma at 8:15 a.m. At 8:50 a.m. some yellow mucus was found on his pillow. At about 9 a.m. he began to have generalized tremors which was not unusual. At 9:10 a.m. more yellow mucus was noted, and the patient was given 50 cc. of a 25 per cent dextrose solution intravenously. He failed to respond, and it was noted that his pupils were pin point, lid reflexes were absent, the toe sign was positive bilaterally, and ankle and patellar clonus were present bilaterally. At 9:20 a.m. he was given dextrose intravenously and he became very restless, as was usual when he responded to prior terminations, his pupils dilated and he began to perspire profusely. The clonus remained, and he did not respond verbally. At 9:30 a.m. he was given 1,000 cc. of 10 per cent dextrose in saline solution, containing 100 mg. of niacin, 50 mg. thiamine, 100 mg. of ascorbic acid, and 10 cc. of Ringer-lactate solution intravenously. The lid reflex returned but he still failed to respond. His pulse was fairly regular at from 140 to 156 per minute. He continued about the same until 10:30 a.m. at which time 2 cc. of metrazol was given intravenously. Following this he became extremely excited, breathed rapidly but did not respond verbally.

At 11 a.m., he was given 4 cc. of paraldehyde intramuscularly to control the motor restlessness and to prevent exhaustion. He calmed down almost immediately and rested easily. At 11:15 a.m. his rectal temperature was 104.2 F., pulse 140, respirations 30, lid reflexes present, and pupils were equal and normal in size. His eyeball movements were coordinated, and he opened his eyes occasionally. Clonus was no longer present and the toe sign was doubtful bilaterally. At noon he was given 500 cc. of plasma. At 12:30 p.m. he started yelling a word or two occasionally and opened his eyes for a few seconds at a time. At 1:30 p.m. he urinated in the bed and then calmed down so that it was believed that the fullness of his bladder was probably the cause of some of his restlessness. At this time he was fairly well-sedated with the paraldehyde, but responded well to stimuli. At 2 p.m. he drank 500 cc. of orange juice containing 275 cc. of a 50 per cent glucose solution. At this time he was fairly quiet, but yelled occasionally. He came out of this coma at about 1 p.m. and had, therefore, been in coma about five hours. His general condition following coma was good.

Comment. Plasma was used in case 4 rather than whole blood transfusion. The saline and Ringer-lactate solutions were necessary in maintaining the proper acid-base balance. Rather large doses of vitamins were administered with the intravenous infusions. In all 4 cases the constant attendance of a medical officer, in addition to the trained insulin team of nurse and ward attendants, and the continuous checking of the patient's condition, are believed to have determined the successful outcome of therapy.

Treatment. The treatment of our cases was both generally symptomatic and specific, as indicated therapeutic needs arose, and was based upon our immediate experiences and those of other investigators. In reviewing the necessary diverse therapy used, the following would appear to have been important:

1. The constant attendance of a medical officer and his trained team.
2. Measures to support the circulation:
    - A. administration of fluids—adequate fluid balance
    - B. administration of cardiac stimulants
    - C. blood transfusions, plasma, etc.
3. Measures to replace tissue deficiencies:
    - A. administration of rather large doses of vitamins, including niacin given with the intravenous infusions
    - B. administration of calcium and potassium salts as indicated
    - C. whole blood transfusions
    - D. nutrient, gavage, etc.
4. Measures to relieve respiratory embarrassment and support respiratory system:
    - A. suction and intratracheal intubation, etc., as indicated
    - B. Trendelenberg position and position changes as indicated
    - C. utilization of ENT for bronchoscopy if indicated
    - D. oxygen administration
    - E. carbogen administration
    - F. penicillin if indicated, etc.
    - G. administration of respiratory stimulants
    - H. atropine, if indicated, for excessive mucus, etc.
5. Measures to relieve excessive motor activity:
    - A. administration of sedatives
    - B. administration of paraldehyde intramuscularly
6. Measures to relieve body temperature upset
    - A. alcohol sponging for hyperthermia, etc.

DISCUSSION

Incidence. At this hospital, of 226 patients who received 5,999 treatments resulting in 4,021 comas, 6 developed prolonged coma. This corresponds favorably with incidence as reported by others. A prolonged coma can be expected once in every 1,877 treatments.[1] Goldman[2] reported that in 5,882 treatments in 108 patients, prolonged coma occurred in 0.41 per cent of all treatments.

Clinical findings. The unvaried order of appearance of the symptoms of hypoglycemia has been explained[4] on the basis of the metabolic rate of each region of the brain. The first to suffer from sugar deprivation are, phylogenetically speaking, the newest portions of the brain, the cerebral hemispheres, and parts of the cerebellum, which metabolize at the highest rate. The symptoms may be divided into cortical, subcorticodiencephalic, mesencephalic, premyelencephalic, and myelencephalic phases. The last phase is the most dangerous and is

recognized by the deep coma and the predominance of parasympathetic signs. The patient's respiration is shallow. The heart rate is slow. The skin is pale and the pupils are contracted, no longer reacting to light. Perspiration and a subnormal temperature are present. The muscles are relaxed, the tendon jerks depressed, and the corneal reflex entirely lost.

The most outstanding feature in insulin coma is the specific clinical pattern of activity which is presented by the individual patients receiving a course of insulin therapy. Deviation from this pattern signals the possibility of impending complications.

Protracted coma, the most dangerous complication of insulin treatment, occurs in patients even after sufficient glucose has been given to raise the blood sugar to abnormally high levels. In the 4 cases reported, the most striking common clinical features were hyperthermia, markedly elevated pulse and respiration, the extremely labile cardiovascular response, the complete areflexia, alternating with marked hypertonia, and extreme generalized motor restlessness. Other workers have reported gradual merging into a state of catatonic stupor, convulsions, vomiting, diarrhea, permanent brain damage, and death.

Physiologic changes during insulin-induced coma. During insulin induced coma, the blood levels of epinephrine, protein, potassium, sodium, calcium, and magnesium are increased, and those of sugar, urea, creatin, chlorides, and phosphates are decreased.[4, 5] Potassium appears to have a biologic action antagonistic to that of insulin. Sodium (e.g., NaCl) exerts a favorable, although perhaps temporary, influence on the carbohydrate metabolism of diabetic children taking simplified diets low in potassium. The following physiologic changes have been reported:[4] (1) stimulation of both parasympathetic and sympathetic branches of the vegetative nervous system; (2) depression of the respiratory center and diminution of its sensitivity to carbon dioxide; (3) increase in the alkaline reserve of the blood; and (4) disturbance of salt metabolism. A high-carbohydrate diet lowers the coma-inducing effect of insulin; a low-carbohydrate diet increases this effect. Leukopenia occurs in the first hour of insulin treatment and is followed later by leukocytosis. In the first hour of treatment, there is a relative increase in lymphocytes. In the third and fourth hours of the hypoglycemia, the number of polymorphonuclear neutrophils is increased. The number of eosinophils also increases during insulin shock. Patients responding to treatment have shown a more marked leukocytosis than those who have failed to respond. The erythrocyte count and the hemoglobin content of the blood increases as a result of the general hemoconcentration. When the blood sugar falls below 50 mg. per 100 cc., a fall in the carbon dioxide tension occurs. Some workers believe there is an impairment of the adrenosympathetic system present in schizophrenic patients prior to treatment. Kalichman[6] states that coma induced by insulin is evidently a result of diminished oxidative metabolism of the brain and that the lack of response to the administration of dextrose may be caused by changed sensitivity to insulin in conditions of prolonged coma when changes in brain metabolism are more extensive and drastic than ordinarily expected in hypoglycemia.

Theories as to Cause of Protracted Coma. Although the cause of prolonged coma is not fully understood, most workers agree that it is not simply a state of hypoglycemia. The most important theories have been reviewed by Spencer,[3] who listed the vascular, the anoxic, the toxic-metabolism, the oxyachrestic or aglucic, the autonomic imbalance, the increased

combustion of protein, and the deficiency of tissue-essentials. The etiology of protracted coma will probably remain unknown until more is discovered about cellular respiration and the effect of hypoglycemia upon it.

Mortality Rate. In our cases no death ensued. The death rate from this complication has been reported as high as 16 per cent, but in large series it is about 0.33 per cent.[1]

*Neuropathologic findings in fatal cases.** The degenerative changes observed by Ferraro[7] in the neurons of fatal cases consist chiefly of: (1) dropping out of neurons, with resulting zones of rarefaction in various cortical areas; (2) focal areas of cellular paucity; (3) areas of cortical devastation and disappearance of Purkinje cells in certain areas in the cerebellum; and (4) acute swelling and chromatolysis of individual neurons. The same observer reported that the vascular changes consist of narrowing of the blood vessels caused by both endothelial and adventitial proliferation.

Treatment. In reviewing treatment of protracted insulin coma, Spencer records therapeutic regimen which parallel our own in many respects. He notes that intravenous saline is of value, but should be administered with caution, since excessive intravenous fluid may overload the heart. In that regard, he recommends the use of a stomach tube. He states that there are theoretical grounds for believing that adrenal cortical extract might be beneficial. Rivers and Rome[5] recommend giving dehydrating substances, based on the presence of intracellular edema of the brain, but others[3] do not agree. Sargent and Slater[8] report favorably on the addition of calcium chloride, coramine, and thiamin to the glucose saline solution. They recommend 16 mg. of morphine or 0.65 mg. of hyoscine for patients who

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* The case of a 62 year old white male, diagnosed hemochromatosis, who went into a hypoglycemic coma of approximately 106 hours' duration following insulin administration is of interest. Following incomplete recovery from the encephalomyelopathy, secondary to the abovementioned hypoglycemia reaction, this patient subsequently died several months later at another hospital. Prior to the prolonged coma, this patient showed no mental abnormalities. He was well oriented, had no intellectual impairment, and was well adjusted. He maintained good contact with reality. There was no family history of nervous or mental disease. Following the episode of prolonged hypoglycemic coma, however, he became emotionally labile, changing from very affectionate to very aggressive, and his behavior became quite childish. He talked irrationally and was disoriented but cheerful. On one occasion, he became quite excited and threatened to cut his throat or wrists or end his life in one way or another, saying "because I am going crazy." It is felt that this change in his mental status, following the prolonged coma, is of interest because of the neuropathologic findings, especially in the thalamus. The histologic findings, not yet reported in the literature by Dr. N. Malamud, showed diffuse degenerative changes in the central nervous system. The cerebral cortex was rarefied showing diffuse dropping out of neurons, sclerosis of others, scattered proliferation of microglia and macroglia. This cortical change was of moderate degree. The most striking changes were seen in the thalamus, where severe loss of neurons had occurred throughout all the main nuclei of the thalamus. There it had reached the intensity of distinct glial proliferation of astrocytes and their fibers, as disclosed in the Holzer preparation. The only other area involved was diffuse dropping out of cerebellar Purkinje cells of moderate degree. There was a mild arteriosclerosis of small blood vessels but not causally connected with the above changes. Also there was a diffuse proliferation of large, naked glial nuclei of the type seen in cases of liver cirrhosis. Dr. Malamud felt that the chronic encephalopathy in this case was attributable to the residual effect of prolonged insulin coma. The predilection for the thalamus is unique. The role of the hemochromatosis and cirrhosis in the cerebral changes, Dr. Malamud thought, apparently not significant both on clinical grounds and the lack of specific hepatolenticular degeneration. He reported the case as one of chronic encephalopathy following prolonged insulin coma.

are restless and excited when coming out of coma. Kalinowsky and Hoch[4] favor whole blood transfusions. Stark and Barrera[9] recommend potassium chloride in doses of 2 Gm. four times a day during the course of insulin therapy as a prophylactic measure.

SUMMARY

Prolonged coma, a serious complication of insulin induced coma, is discussed and 4 cases successfully treated for this condition are presented. The procedure for induction and termination of insulin coma is detailed. The incidence, clinical findings, physiologic changes, theories as to the cause of protracted coma, mortality rate, neuropathologic findings in fatal cases, and treatment of the condition are reviewed.

Significant therapeutic factors were revealed in a review of our cases. Maintenance of fluid balance, support of circulatory and respiratory systems, and other supportive measures, were noted as therapeutically beneficial. Paraldehyde was considered the drug of choice, used intramuscularly, to combat the excessive motor activity which was present in all 4 cases. Saline and Ringer-lactate solutions were necessary in maintaining the proper acid-base balance. It is believed that laboratory aids were of little help in determining the successful course of treatment. The most important single element in successful therapy proved to be the constant attendance of a medical officer and his trained team, alerted to the minute by minute clinical condition of the patient ("observing with the third eye") as reflected by the temperature, blood pressure, respiratory rate and quality, depth of coma, appearance of complications, central nervous system state, etc., and is equipped to handle any anticipated emergency.

RESUMEN

El autor presenta una lista de los procedimientos terapéuticos utilizados en el Letterman Army Hospital, para combatir el coma insulínico prolongado y revisa la literatura médica al respecto. Se permite que los pacientes permanezcan en coma entre 15 y 90 minutos y para terminarlo se les administran 50 c.c. de una solución de glucosa al 30 %, por vía intravenosa, repitiéndola entre 10 y 15 minutos después, si no responden a la primera. También se utilizan, cuando es necesario, transfusiones de sangre total, glucosa al 10 %, gluconato de calcio, solución de Ringer, suero fisiológico, plasma, y niacina por vía intravenosa; adrenalina y atropina por vía intramuscular; oxígeno y CO_2 por inhalación; fricciones mediante una esponja empapada en alcohol, para evitar que la temperatura ascienda a niveles peligrosos y succión postfaríngea e intratraqueal, cuando esté indicado. Se mantiene una estrecha coordinación con la sección de otorrinolaringología y oftalmología, practicándose en ciertos casos broncoscopias. Para combatir la excesiva actividad muscular que se presentó, como complicación en todos los casos del autor, se administraron 4 c.c. de paraldehido por vía intramuscular.

Cabe esperar que se presente un coma prolongado cada 1.877 tratamientos.[1] En el hospital del autor se administraron a 226 pacientes 5.999 tratamientos que produjeron 4.021 comas, observándose 6 comas prolongados. Se describen varias teorías relativas a las causas

del coma prolongado y se explican detalladamente los cambios fisiológicos, presentándose 4 historias clínicas.

RESUME

L'auteur présente une liste des procédés thérapeutiques utilisés à Letterman Army Hospital, pour combattre le coma insuline prolongé, et une revue de la littérature médicale à ce sujet. On permet aux patients de demeurer dans le coma pendant 15 à 90 minutes, et pour terminer le coma on utilise 50 cm³ d'une solution de glucose à 30%, par voie intraveineuse, à répéter 10 à 15 minutes plus tard s'ils ne répondent pas à la première injection. On utilise aussi, quand il est nécessaire, transfusions de sang total, glucose à 10%, gluconate de calcium, solution de Ringer, sérum physiologique, plasma, et niacine par la voie intraveineuse; adrénaline et atropine par la voie intramusculaire; oxygène et carbone par inhalation; frictions au moyen d'une éponge imbibée d'alcool, pour éviter que la température s'élève à un niveau dangereux; succion postpharyngienne et intratrachéale, lorsque indiquée. On maintient une étroite coordination avec la section otorhinolaryngologique et ophtalmologique, et en certains cas on utilise la bronchoscopie. Pour combattre l'activité musculaire excessive qui se présente comme complication dans tous les cas de l'auteur, on administre 4 cm³ de paraldéhyde par la voie intramusculaire.

On peut s'attendre à un coma prolongé à chaque 1.877ème traitement. À l'hôpital de l'auteur, 5.999 traitements administrés à 226 patients ont produit 4.021 comas, desquels 6 ont été des comas prolongés. Les théories relatives à la cause du coma prolongé sont décrites et les changements physiologiques sont expliqués en détail. On présente quatre histoires cliniques.

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Plasma Glutamic Acid Levels in Health and Disease

PART I. A REPORT ON NORMAL CONTROLS*

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In the cause of biochemical investigations on the schizophrenias, it was decided to study plasma levels of glutamic acid because of its suspected role in brain metabolism. In this paper, plasma glutamic acid determinations of "normal" controls are presented as well as the technic and procedures employed. Subsequent articles will report findings in various psychiatric categories (e.g., hospitalized schizophrenics) and will discuss the implications of these findings.

BACKGROUND

Weil-Malherbe[1] has reported that *in vitro* preparations of brain tissue preferentially burn glutamic acid out of 13 amino acids studied. Mayer-Gross and Walker[2] have observed that glutamic acid administered intravenously is followed by a rapid restoration of consciousness to patients, although blood sugar levels remain subnormal. The feeding of glutamic acid to mentally deficient children has had different results in the hands of different investigators. These studies have been summarized by several workers.[3, 4, 5] While some have maintained that there is no clinical effect, others[5] believe that their data indicate a statistically significant degree of improvement in mental performance after glutamic acid feeding period. According to Waelsch,[6] large doses of glutamic acid *per os* ameliorate the cause of petit mal but do not affect grand mal epilepsy.

PROCEDURES AND METHODS

Glutamic acid was measured in the protein-free filtrate of blood plasma of fasting subjects during the months of January, February, and March, 1952. Venous blood was drawn between the hours of 8:30 a.m. and 10 a.m. from subjects in the postabsorptive state. The blood was collected in heparinized syringes,‡ placed in heparinized tubes, and

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‡ The authors wish to thank Organon, Inc., for the supply of Liquaemin, Organon which was utilized for heparinization of glassware.

plasma separated within two hours. The plasma protein was precipitated with the tungstate—sulfuric acid reagent of Folin and Wu. The microbiologic technic followed that of Hac, Snell, and Williams,[8] as modified by Henderson and Snell.[9] The procedure is based on the original observation of Olcott[10] that glutamic acid is necessary for optimum growth of *Lactobacillus arabinosus* 12–5, culture #8014, American Type Culture Collection, Georgetown University, Washington, D. C. The conventional medium of Henderson and Snell was used, free of aspartic acid.

A standard series of dilutions was prepared in triplicate for each assay, using d,l-glutamic acid monohydrate as the standard. Growth is measured by titration of lactic acid produced by the microorganism, with 0.025 N NaOH, using brom-thymol-blue as indicator. The titration range in this study was 0.3 to about 6 cc. of 0.025 N NaOH over a range of 0 to 50 micrograms of glutamic acid per tube. Samples were determined at two or three aliquots in triplicate, or in duplicate when quantities of plasma were too limited to permit further replication. Agreement in titration volumes of 0.1 cc. or better was required. The method was checked for accuracy and reproducibility by using two levels of sample aliquot and obtaining a proportional increase in titration values. Several assays have been repeated on plasma from the same subjects, with agreement better than ± 10 per cent.

CLINICAL MATERIAL

The subjects were 38 volunteers and unselected controls between the ages of 21 and 51 years and without apparent mental or physical illness. Of the 18 males and 20 females that made up the group of 38, 17 were members of Creedmoor Institute staff, 6 were student nurses, 6 were hospital administrative personnel, 8 were employees of a business firm, and 1 was a visitor.

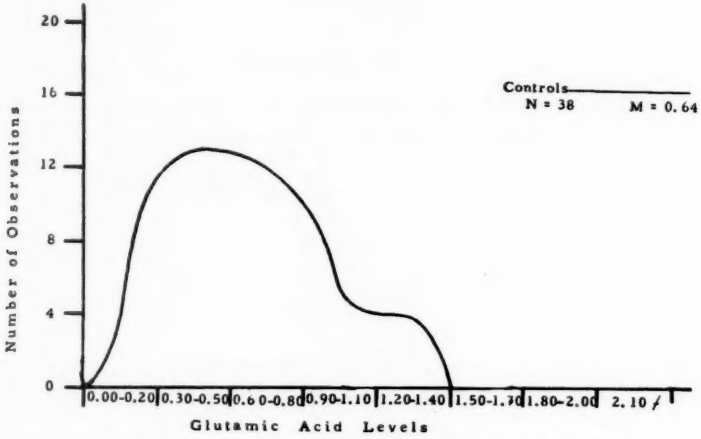

FIG. 1. Distribution curve of plasma glutamic acid levels in 38 controls.

RESULTS

The data are presented in Table I and a distribution curve is plotted in figure 1. The plasma glutamic acid levels ranged from 0.0 to 1.4 mg. per cent with a mean of 0.64 mg. per cent. There was no significant difference between the plasma levels of the males and females in this study. However, there was a difference between the determinations performed in January and those in February and March, an apparent increase in plasma level being noted.*

DISCUSSION

Including the present study, in the literature there are seven reports on plasma glutamic acid levels in a total of 188 "control" subjects based on three different analytical methods.[8, 11, 12] The present data are listed in Table II in descending order of mean glutamic acid level and fall into groups by method. Though values are discordant, they are fairly consistent within each of the methods.

The plasma glutamic acid levels determined by microbiologic methods in this study of 38 normal subjects, i.e., individuals without apparent mental or physical illness, are in close agreement with those reported by Harper[13] utilizing a similar technic.

The means and range of normal values found by Prescott and Waelsch[11] in 6 subjects agree with those recently obtained by Beaton, McGanity, and McHenry[14] using the same chemical method in 83 cases. The finding of a possible sex difference by the latter workers was not apparent in our data.

Whi'e the above reported data are consistent within the method employed, findings obtained by the enzymatic method of Krebs[12] were not in agreement with the results of either the chemical or microbiologic methods. Krebs and coworkers[15] report a mean of 3.4 mg. per cent and a range of from 1.3 to 5.9 mg. per cent; Astrup and Munkvad[16] and Munkvad[17] (in close agreement with each other) record means of 2.3 mg. per cent and 2.29 mg. per cent and

* The mean of control levels in January was 0.500 mg.%, in February and March 0.757 mg.%. Although there is not a significant difference between means at the 1 per cent probability level, there is a significant difference at the 5 per cent level, which implies that the results may not be explainable on the basis of random sampling alone. Further sampling is required to determine what factors caused this variation.

Two serial determinations made on 6 of the control subjects indicate the range of fluctuation within the same month:

Subject No.	Date of 1st Determination	Date of 2nd Determination	Glutamic Acid Levels 1st	2nd
A 87	1/15/52	1/17/52	0.5	0.0
A 90	1/11/52	1/23/52	0.8	0.7
A 92	1/8/52	1/18/52	0.2	0.3
A 93	1/8/52	1/18/52	0.3	0.1
A 100	1/11/52	1/24/52	0.4	0.3
A 103	1/15/52	1/24/52	0.2	0.6

TABLE I

Plasma Glutamic Acid Levels in Normal Controls

Subject	Sex	Age	Date of Sample	Glutamic Acid mg. %
X 81	M	32	2/26/52	1.4
X A 11	M	27	3/26/52	1.4
A 89	F	30	1/18/52	1.3
X A 14	F	39	3/26/52	1.2
X A 18	M	41	3/26/52	1.1
A 77	F	34	1/8/52	1.1
A 9	M	—	2/15/52	1.0
A 10	F	—	2/15/52	.9
A 6	M	42	3/6/52	.9
A 90	M	27	1/11/52	.8
A 91	F	22	1/11/52	.8
A 63	F	36	1/11/52	.8
A 11	M	—	2/15/52	.8
A 12	F	—	2/15/52	.7
A 1	F	33	3/6/52	.7
A 4	F	27	3/6/52	.7
A 5	F	51	3/6/52	.7
A 2	F	21	3/6/52	.6
A 3	M	23	3/6/52	.6
X A 13	M	34	3/26/52	.6
A 105	F	38	1/8/52	.6
A 87	F	45	1/15/52	.5
A 13	F	—	2/15/52	.5
A 14	M	—	2/15/52	.5
X A 21	F	40	3/26/52	.5
A 100	M	35	1/11/52	.4
A 84	F	25	1/24/52	.4
X A 17	M	43	3/26/52	.4
X A 20	M	40	3/26/52	.4
X A 15	M	39	3/26/52	.3
A 93	M	26	1/8/52	.3
A 71	F	23	1/15/52	.3
A 88	M	24	1/15/52	.3
A 76	F	28	1/18/52	.3
A 92	M	41	1/8/52	.2
A 103	M	32	1/15/52	.2
A 50	F	23	1/18/52	.2
A 78	F	23	1/17/52	0.

ranges from 1.25 to 3.47 mg. per cent and 1.22 to 3.16 mg. per cent respectively. Recent work by Meister and his associates[18] explains the reason for the high results obtained by the enzymatic procedure. In the original method of Krebs, an inhibitor of aspartic decarboxylase

TABLE II

Comparison of Plasma Glutamic Acid Levels Determined by Three Different Technics

Mean of Glutamic Acid–mg. %	Glutamic Acid Range–mg. % From	To	Method	Clinical Material	Investigator
3.4	1.3	5.9	Enzymatic–Plasma	11 hospitalized "normals" (?)	Krebs (1949)[15]
2.30	1.25	3.47	Enzymatic (After Krebs)	20 "normal male subjects"	Astrup and Munkvad (1951)[16]
2.29	1.22	3.16	Enzymatic (After Krebs)	20 "normal persons"	Munkvad (1950)[17]
1.2	0.7	2.0	Chemical-Plasma	26 "normal males"	Beaton, McGanity &
1.0	0.5	1.8	(After Prescott & Waelsch)	57 "normal females"	McHenry (1951)[14]
1.1	0.6	1.7	Chemical-Plasma	6 "healthy" subjects	Prescott & Waelsch (1947)[11]
<0.81	<0.5	1.4	Microbiologic-Plasma (After Hac, Snell, and Williams)	10 males–Naval Personnel	Harper (1947)[13]
0.64	0.0	1.4	Microbiologic-Plasma (After Henderson & Snell)	18 "normal" males 20 "normal" females No significant sex difference	Sackler, Sanders, et al (as reported herein)

(cetyltrimethyl ammonium bromide) was used in such concentration as to activate glutamic acid decarboxylase, but not in sufficient amount to inhibit completely the decarboxylation of aspartic acid. Thus, the concentration of evolved carbon dioxide, used as a measure of glutamic acid present, was falsely high.

While absolute values await the development of more precise methodology, the differences between relative levels of normal subjects and of patients with mental disease may throw some light on psychopathology, as the companion paper indicates (page 26).

SUMMARY

Plasma glutamic acid levels in 18 male and 20 female subjects determined by a microbiologic technic are reported. A range of from 0.0 to 1.4 mg. per cent with a mean of 0.64 mg. per cent was found. There was no difference between the levels based on sex; however, a difference between determinations made in January and those in February and March was found and is under current investigation. The data are compared with those in the literature.

RESUMEN

En este trabajo se comunican las concentraciones plasmáticas de ácido glutámico en 18 hombres y 20 mujeres, determinados por una técnica microbiológica. Se halló una escala

de 0,0 a 1,4 mg. por ciento, con una media del 0,64 por ciento. No hubo diferencias entre las concentraciones, según el sexo. Sin embargo, se observaron diferencias entre las halladas en Enero y las de Febrero y Marzo, continuándose las investigaciones. Se comparan estos datos con los que existen en la literatura médica.

RESUME

Dans cette étude on communique les concentrations plasmatiques de l'acide glutamique chez 18 hommes et 20 femmes, déterminées par une technique microbiologique. Les concentrations variaient de 0,0 à 1,4 mg p. cent avec une moyenne de 0,64 mg p. cent. Il n'y a pas eu de différence entre les concentrations des deux sexes, cependant on a observé une différence entre les déterminations faites en janvier et celles de février et mars, et nous poursuivons en ce moment des recherches à ce sujet. Les données sont comparées avec celles de la littérature médicale.

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Plasma Glutamic Acid Levels in Health and Disease

PART II. A REPORT ON HOSPITALIZED SCHIZOPHRENICS*

Mortimer D. Sackler, M.D., Rosaltha H. Sanders, Ph.D., Arthur M. Sackler, M.D., and Raymond R. Sackler, M.D.†

In a previous report,[1] which involves one facet of our investigation of amino acid and protein metabolism in major psychiatric disorders, the potentiality of glutamic acid[2–7] in the plasma both as an important biologic substance and as a differential index for normal and psychiatric states was noted. In the present work, plasma glutamic acid levels of hospitalized schizophrenics are reported. The findings are compared to previously reported[1] levels on "normal" controls and some implications of these findings are recorded.

MATERIAL AND METHODS

Forty-two hospitalized schizophrenic patients from continued care pavilions of Creedmoor State Hospital served as subjects. Pertinent data for each patient are listed in Table I.‡

Glutamic acid was measured in the protein-free filtrate of blood plasma of fasting patients. The technic and procedures employed were those established for the determinations on normal controls and are detailed in the previous paper.[1] As frequently as possible, plasma samples of controls and patients were analyzed at the same time to reduce source of error. This phase of the studies in glutamic acid extended over an 11-week period.

RESULTS

The plasma glutamic acid level of each patient is presented in Table I and the range and mean are given in Table II.

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* Part of report originally presented at the Downstate Interhospital Conference of the Department of Mental Hygiene of New York State, April, 1952.

† Dr. Mortimer D. Sackler and Dr. Raymond R. Sackler are serving in the United States Army, and Dr. Rosaltha H. Sanders and Dr. Arthur M. Sackler are with the Creedmoor Institute for Psychobiologic Studies, Queens Village, New York.

‡ Five repeat determinations on the patients listed below have not been included.

Patient No.	Date of 1st Determination	Date of 2nd Determination	Glutamic Acid Level 1st	2nd
5394	1–22–52	2–28–52	1.8	1.7
5247	1–11–52	1–15–52	1.4	1.2
5252	1–23–52	2–4–52	1.4	1.1
5246	1–22–52	2–28–52	0.7	2.8
5133	1–15–52	1–22–52	0.5	0.5

Studies are in progress to determine the amount of glutamic acid fluctuation that occurs within the individual.

TABLE I

Plasma Glutamic Acid Levels in 42 Hospitalized Schizophrenic Patients

Patient	Sex	Age	Diagnosis	Pavilion	Duration (in days) of Illness	Duration (in days) of Hospitalization	Date of G.A.	G.A. Blood Level	Current Treat.
5238	M	26	DPC	P	1815	730	2–12–52	3.0	None
5394	F	29	DPP	L	3650	730	1–22–52	1.8	None
5104	F	39	DPP	L	5840	2930	2–4–52	1.7	None
5242	M	24	DPC	P	1460	730	1–23–52	1.7	None
5481	F	41	DPC	L	5840	5840	1–23–52	1.5	None
5224	F	28	DPC	L	1460	850	3–6–52	1.5	None
5231	M	49	DPC	Rec. 4	9125	68	3–27–52	1.5	None
5235	M	26	DPC	Rec. 2	1095	530	3–27–52	1.5	None
5484	M	41	DPC	P	2555	2555	3–27–52	1.4	None
5225	F	23	DPP	L	730	210	3–6–52	1.4	None
5260	M	36	DPP	P	6205	6205	3–27–52	1.4	None
5485	M	31	DPP	P	940	790	3–6–52	1.4	None
5482	M	18	DPC	Rec. 8	86	77	3–27–52	1.4	None
5230	M	19	DPC	Rec. 8	395	240	3–27–52	1.4	Cortisone*
5232	M	25	DPC	Rec. 2	685	535	3–27–52	1.4	None
5233	M	21	DPC	Rec. 8	1610	82	3–27–52	1.4	ECT†
5234	M	47	DPC	Rec. 4	10950	64	3–27–52	1.4	ECT‡
5247	F	39	DPC	L	4015	4015	1–11–52	1.4	None
5252	M	21	DPC	P	2920	1095	1–23–52	1.4	None
5486	F	24	DPH	L	730	730	1–18–52	1.3	None
5237	F	42	DPC	L	3650	3650	1–23–52	1.3	None
5226	M	22	DPC	P	365	365	3–6–52	1.3	None
5487	M	47	DPC	P	1095	1095	3–27–52	1.2	None
5227	F	43	DPC	L	5475	4195	3–6–52	1.2	None
5054	F	33	DPC	O	5475	1095	1–11–52	1.2	None
5065	F	37	DPH	L	2920	1460	2–4–52	1.2	None
5251	M	32	DPH	P	3650	1825	2–4–52	1.2	None
5236	M	35	DPC	P	4745	4745	2–4–52	1.1	None
5488	F	32	DPC	L	3285	3285	2–4–52	.9	None
5228	F	39	DPC	L	6265	4805	3–6–52	.9	None
5229	M	27	DPC	P	2920	1095	3–6–52	.8	None
5077	M	35	DPC	N	5840	5475	1–11–52	.8	None
5039	M	38	DPP	P	1460	790	1–11–52	.8	None
5240	F	35	DPP	L	3468	2920	2–12–52	.8	None
5246	F	32	DPP	L	3220	730	1–22–52	.7	None
5134	M	29	DPC	S	3650	3650	1–22–52	.7	Propyl. and HT§
5244	F	40	DPP	L	6205	6205	2–4–52	.6	None
5133	M	30	DPC	S	4745	2555	1–15–52	.5	Proloid & HT‖
5239	M	38	DPP	P	4380	548	1–23–52	.5	None
5250	M	41	DPC	P	12045	4745	2–4–52	.5	None
5142	M	28	DPC	S	4745	2190	1–18–52	.3	None
5248	F	38	DPP	L	2555	2190	1–15–52	.0	None

* Cortisone Treatment began 3–19–52; no change in clinical status.

† Sixteen ECT from 2/13/52 to 3/21/52; slight improvement.

‡ Twelve ECT from 2/22/52; slight improvement.

§ Concluded Histamine Therapy (HT) and Propylthiouracil 2 /25 /52; no change.

‖ Concluded Histamine Therapy (HT) and Proloid 2 /22 /52; moderate improvement.

TABLE II

Range and Mean of Plasma Glutamic Acid Levels in Hospitalized Schizophrenic Patients as Compared to "Normal" Controls

	Number	Range From	To	Mean
Normal Controls[1]	38	0.0	1.4 mg.%	0.64 mg.%
Hospitalized Schizophrenics				
Total Number	42	0.0	3.0 mg.%	1.18 mg.%
Catatonic	28	0.3	3.0 mg.%	1.24 mg.%
Hebephrenic	3	1.2	1.3 mg.%	1.23 mg.%
Paranoid	11	0.0	1.8 mg.%	1.01 mg.%

A difference in plasma glutamic acid levels of hospitalized schizophrenics and of "normal" controls is noted; the distribution curves for the two groups are plotted in figure 1.

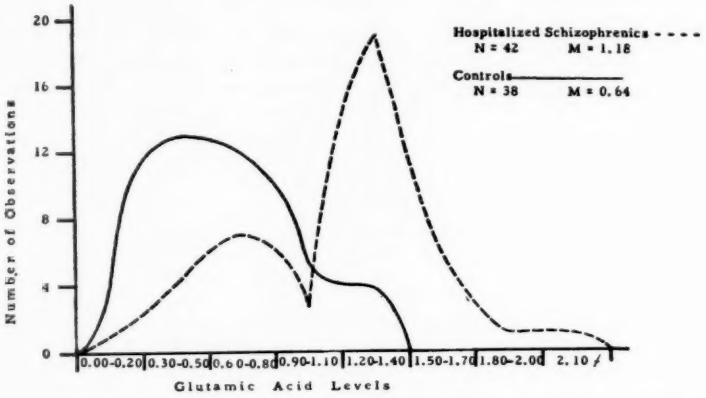

FIG. 1. Distribution curves of plasma glutamic acid levels in 42 hospitalized schizophrenics and 38 controls.

There is no significant difference between the plasma glutamic acid level of 25 male schizophrenics and 17 female schizophrenics, the respective mean levels being 1.20 mg. per cent and 1.14 mg. per cent. Determinations performed in January to mid-February and from the end of February through March revealed a small difference which, however, was not significant.*

* Twenty-five determinations were done from 1/11/52 to 2/12/52 yielding a mean of 1.08 mg. per cent. Seventeen determinations were done from 2/28/52 to 3/27/52 yielding a mean of 1.32 mg. per cent. No significant difference between the means was found at the 5 per cent probability level.

TABLE III

Plasma Glutamic Acid Levels in Normal and Schizophrenic Individuals as Determined by Different Technics

Method	Investigators	Psychiatric Status	Number Studied	Mean Level Glutamic Acid in mg.%	Range of Glutamic Acid From	To
Microbiologic (After Henderson and Snell)[14]	Sackler, et al[1]	Normal	38	0.64	0.0	1.4
	Sackler, et al (this paper)	Schizophrenic	42	1.18	0.0	3.0
Microbiologic (After Hac, Snell and Williams)[15]	Harper[13]	Normal	10	0.9	<0.5	1.4
Chemical	Prescott & Waelsch[11]	Normal	6	1.1	0.6	1.7
Chemical	Waelsch[14]	Epileptics			0.5	1.1
Chemical (After Prescott and Waelsch)[11]	Beaton, McGanity and McHenry[12]	Normal males	26	1.2	0.7	2.0
		Normal females	57	1.0	0.5	1.8
Enzymatic (After Krebs)[10]	Munkvad[8]	Normal	20	2.33	1.22	3.16
		Schizophrenic	95	1.2	0.11	3.77
Enzymatic (After Krebs)[10]	Astrup & Munkvad[9]	Normal	20	2.3	1.25	3.47
		Schizophrenic total	201	1.01	0.00	3.77
		1 yr.	15	0.19	0.00	0.65
		1–5 yrs.	40	0.62	0.00	1.74
		1–10 yrs.	27	0.79	0.11	1.64
		Active & 10 yrs.	58	0.67	0.00	3.67
		Inactive & 10 yrs.	61	1.89	0.09	3.77
Enzymatic (After Krebs)[10]	Astrup & Munkvad[9]	Epileptics	16	1.21	0.35	2.44

DISCUSSION

The data reveal an association between plasma glutamic acid level and psychiatric classification of the individual; the levels in hospitalized schizophrenics as a group are significantly higher than those in "normal" controls.* This difference may permit the

* Utilizing the t test, we find that the difference between the means of the two groups is significant at the 1 per cent level.

identification of schizophrenic patients on biologic grounds and may have added clinical import should it be found to precede the onset of overt psychopathology. Furthermore, if association is later demonstrated with other biologic findings; e.g., histamine tolerance, insulin tolerance, ACTH responsivity, etc., and with psychologic test data, the construction of a pathophysiologic basis for psychiatry would be advanced.

In a Danish study, Munkvad and Astrup[8] and Munkvad[9] reported the glutamic acid and glutamine levels in normals and in schizophrenics. They utilized the enzymatic technic of Krebs[10] and reported a significant difference between normals and schizophrenics. However, their findings are at variance with ours, since they obtained higher glutamic acid levels in controls than in schizophrenics. Furthermore, their findings on normals are also at variance with those of Prescott and Waelsch[11] and of Beaton, McGanity, and McHenry,[12] who utilized the chemical method, and of Harper[13] who employed the microbiologic technic. The findings of the various investigators are recorded in Table III.

The finding of elevated plasma glutamic acid titers in schizophrenics raises certain considerations. The cause of a rise in blood concentration of a given biologic substance must include one or more of the following factors:

(1) increased intake, (2) decline in rate of excretion, (3) decline in rate of utilization, and (4) overproduction by increased catabolism of precursors.

The first factor is ruled out in this group of patients, whose total nitrogen intake is approximated to be 50 mg. per day and lower than that of control subjects. As for the second possibility, the amino acid level in normal urine is reportedly extremely low; a further reduction would have little effect on blood levels. It would appear that the last two factors, namely, decline in rate of utilization and, overproduction of glutamic acid, deserve further investigation.

SUMMARY

Determination of the plasma level of glutamic acid in 42 schizophrenic hospital patients was found to have a mean of 1.18 mg. per cent, with a range from 0.0 to 3.0 mg. per cent. The difference in plasma glutamic acid levels in these patients and in "normal" controls is noted. All reports on plasma glutamic acid levels in schizophrenic and epileptics, together with findings obtained simultaneously on normal controls are compiled. Considerations relating to the difference in titers of schizophrenics and "normals" and to the elevated levels in the former group are introduced.

RESUMEN

Se determinó la concentración plasmática de ácido glutámico en 42 pacientes esquizofrénicos hospitalizados. Se halló una escala de 0,0 a 3 mg. por ciento, con un promedio de 1,18 mg. Se anota la diferencia en las concentraciones plasmáticas de ácido glutámico en otros pacientes y en testigos "normales." Se compilaron en este trabajo, las concentraciones plasmáticas de ácido glutámico en esquizofrénicos y epilépticos, junto con los hallazgos obtenidos simultáneamente en los testigos normales. Se hacen consideraciones acerca de la

diferencia que existe entre las concentraciones en los esquizofrénicos y los "normales" y las elevadas concentraciones halladas en el último grupo.

RESUME

On a déterminé la concentration plasmatique de l'acide glutamique chez 42 patients schizophrènes hospitalisés. La moyenne des concentrations a été de 1,18 mg p. cent, s'échelonnant de 0,0 à 3,0 mg p. cent. On note la différence des concentrations plasmatiques de l'acide glutamique chez ces patients comparés à des groupes-témoins "normaux." On compile tous les rapports faits sur les concentrations plasmatiques de l'acide glutamique chez le schizophrène et l'épileptique, ensemble avec les constatations faites simultanément sur les groupes-témoins "normaux." On discute la différence qui existe entre les concentrations des schizophrènes et des "normaux" et les concentrations élevées trouvées dans le premier groupe.

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QUARTERLY REVIEW OF PSYCHIATRY AND NEUROLOGY

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editorial

Memorial Tribute to Col. Roy D. Halloran

The contributions to military psychiatry made by the late Colonel Roy D. Halloran* are commemorated by the plaque presented recently to Walter Reed Army Medical Center, Washington, D. C., by the American Psychiatric Association and some of his former colleagues. Colonel Halloran was the first civilian chief consultant in psychiatry appointed to the office of the Surgeon General of the Army when the outbreak of World War II made psychiatric service such a vital concern to the armed forces.

The memorial plaque bears the following inscription: "Colonel Roy D. Halloran, M.C. August 4, 1894—November 10, 1943. As a result of his unceasing efforts, psychiatry gained a status equal to that of medicine and surgery in the United States Army Medical Service."

Dr. Winfred Overholser, superintendent of St. Elizabeths hospital, Washington, D. C., presented the plaque in a ceremony on Dec. 15, 1953, in behalf of the American Psychiatric Association, of which he is a former president. It was accepted by the Medical Center's commanding general, Major Gen. Leonard D. Heaton. The ceremony began with a brief address by Brig. Gen. Rawley E. Chambers, chief of the Professional Division in the Surgeon General's office and one of the pillars of psychiatry in the Army Medical Corps.

The certificate, presented by Maj. Gen. George E. Armstrong, Army Surgeon General, cited Colonel Halloran for his outstanding achievement in establishing the groundwork for a complete and effective Army psychiatric program in World War II, and for his efforts to increase recognition of the value of such a program. "Through his planning and leadership, organized psychiatric care in Army hospitals, screening

* A native of Cambridge, Mass., Colonel Halloran was educated at Dartmouth College and the College of Physicians and Surgeons of Columbia University. He first demonstrated his aptitude for administration and research in the Massachusetts State Hospital Service, where he helped establish the research department. From 1929 to 1933 he served as assistant to the Commissioner of Mental Diseases in Boston and then was appointed the first superintendent of the Metropolitan State Hospital in Waltham, Mass. He established the Post-graduate Seminars there and taught psychiatry at Tufts Medical School. When he became the army's chief civilian consultant, he was commissioned a colonel and designated chief of the Neuropsychiatry Branch, which later became a division.

Colonel Halloran achieved most of his program in the brief year and a half between his appointment in April, 1942, and his death of coronary occlusion on Nov. 10, 1943, in Walter Reed Hospital. Colonel Halloran's body is buried in Arlington Cemetery, where his widow was also interred.

(l. to r.) Donald J. Halloran, Maj. Gen. Leonard D. Heaton, Mrs. Franklin Navarro (nee Roberta Halloran), and Dr. Winfred Overholser observe the plaque commemorating the late Colonel Roy D. Halloran. During the commemorative ceremonies, Gen. Armstrong presented a Certificate of Achievement to Colonel Halloran's daughter, Mrs. Franklin Navarro, of Houston, Texas, who accepted it for herself and her brother, Donald Halloran.

procedures . . . and clinics at training centers were developed. . . . Through his own personal efforts, (he) persuaded several of the nation's outstanding psychiatrists to join him in his mission of building an effective psychiatric program in the army. . . . As a result, psychiatry gained a status equal to that of medicine and surgery and ultimately shared in a previously unprecedented medical record for the World War II period. Colonel Halloran's contributions deserve the unending gratitude of the U. S. Army. . . ."

In his presentation address, Dr. Overholser, a long-time friend of Colonel Halloran, spoke of his former colleague's exceptional services to the Army and to military psychiatry. He expressed the gratitude of the A.P.A. and Colonel Halloran's friends for the opportunity of demonstrating in permanent form "their heartfelt tribute to the memory of a faithful friend, a progressive psychiatrist, a pioneer in the applications of psychiatry to furthering military efficiency, a fine officer and gentleman."

Recalling the A.P.A.'s insistence on the importance of profiting from the lessons of World War I in psychiatric service, which led to the appointment of the army's first civilian chief consultant, Dr. Overholser attributed to Colonel Halloran the effective organization of psychiatric services in the army and the initiation of several valuable innovations. Among his accomplishments mentioned by the speaker were the establishment of the School of Military Neuropsychiatry for the training of medical officers; organization of mental hygiene units in replacement training centers and of psychiatric service at induction centers; creating positions of service command psychiatrists; and revival of the position of division psychiatrist, which proved so valuable in the first world war.

ABSTRACTS

psychiatry

ALCOHOLISM AND DRUG ADDICTION

1. *Effects of Chronic Barbiturate Intoxication on Motivation and Muscular Co-ordination.* HARRIS E. HILL AND RICHARD E. BELLEVILLE, Lexington, Ky. Arch. Neurol. & Psychiat. *70*: 180–188, August 1953.

Ten male patients, addicted to barbiturates upon arrival at the Public Health Service Hospital, Lexington, Ky., who volunteered for the study were maintained on large doses of secobarbital (seconal) for periods ranging from 35 to 90 days. Reaction times to visual stimuli and quantified measures of muscular co-ordination were taken: (a) during the last week of addiction (intoxication), (b) after abrupt withdrawal of the drug, and (c) after recovery from drug effects.

Great loss of co ordination was found during intoxication and during the first eight days of the withdrawal period, with gradual improvement continuing through the remaining 10 days. Reaction time was found to be very greatly impaired during intoxication and early in the withdrawal period; but, unlike co-ordination, it showed significant improvement soon after withdrawal and thereafter gradually returned to the control level.

Differences in reaction time corresponding to various foreperiods, or delay times, were evaluated as motivational differences; i.e., they were evaluated as differences in ability to develop a "set" or a "readiness to respond." Insensitivity to changes in foreperiods was found during intoxication. Sensitivity increased after withdrawal of the drug and was apparently normal after three to five months of enforced abstinence.

In view of the observed severe muscular inco-ordination and lack of ability to acquire and maintain readiness to respond, it was concluded that the general behavior of chronic barbiturate users is very severely impaired. They lack the ability to prepare for and react efficiently in performing manipulative tasks. It appears, moreover, that they could not anticipate emergencies and that they would be very hazardous machine operators.—17 references. 2 figures. 3 tables.—*Author's abstract.*

2. *Neurologic Complications of Chronic Alcoholism.* LOUIS L. TUREEN AND ANDREW L. HAHN, St. Louis, Mo. J. Missouri M.A. *50*:766–774, October 1953.

A series of cases manifesting a variety of neurologic syndromes resulting from chronic alcoholism are described, including five examples of Wernicke's syndrome,

four of Korsokoff's psychosis, one of nicotinic acid deficiency encephalopathy, and eight of peripheral neuropathy. Several of these syndromes coexisted in some of the cases, reports of which are presented. Etiologic factors, clinical findings, and principles of treatment are discussed. The literature is reviewed.

Experimental hemorrhagic encephalopathy, produced by deficiency of thiamin in the presence of adequate dosages of riboflavin, vitamins A, B, and D, is pathologically identical with human lesions of well established Wernicke's Syndrome. These consist of small foci of degeneration, varicose deformity of vessels, subacute necrosis of the adjoining parenchyma, petechial hemorrhages, and proliferation of the endothelial and adventitious elements of the vascular walls in the periventricular and periaqueductal gray matter. Clinically the syndrome in individuals with thiamine deficiency is commonly ushered in by superimposed acute metabolic stress, e.g., delirium tremens, protracted vomiting, or other somatic illnesses. Onset is generally rapid, and accompanied by wavering of the field of vision, diplopia, photophobia, and disturbance in memory and ability to concentrate. Clouding of consciousness, ophthalmoplegia, pupillary disturbances, ataxia, and peripheral neuropathy feature well developed cases. Other clinical manifestations include dysarthria, bradycardia, or tachycardia, bradypnoea or irregular respirations, hyperpyrexia, tremors or rigidity, and epileptiform convulsions. Korsakoff psychosis is a frequent residual. Differential diagnosis is not ordinarily difficult; in the presence of an alcoholic history, sudden onset, clouding consciousness, ophthalmoplegia, ataxia, and peripheral neuropathy, with normal spinal fluid, the diagnosis is fairly certain. Two of the 5 cases described in this paper died and at autopsy exhibited characteristic pathologic findings. The other 3 made prompt recovery following accurate diagnosis and adequate therapy.

Korsakoff's psychosis is now generally regarded as the psychiatric syndrome of the chronic alcoholic encephalopathies. Confusion, disorientation, memory loss, and confabulation constitute the principal psychiatric features. Peripheral neuropathy is a characteristic clinical finding. The patients in the series who recovered from Wernicke's syndrome manifested symptoms of Korsakoff's syndrome. Mental symptoms usually are of long duration.

Nicotinic acid deficiency encephalopathy is characterized by clouding of consciousness and changing rigidities of the extremities, accompanied by grasping and sucking reflexes and support reactions. Unless recognized, the mortality rate exceeds 85 per cent; prompt treatment with adequate doses of sodium nicotinate acid deficiency is lifesaving. This syndrome is differentiated from pellagra by its sudden onset, the characteristic mental symptoms, and the absence of the usual skin and mouth lesions of pellagra.

Peripheral polyneuropathy, now accepted as a nutritional deficiency disease, particularly the B vitamins, and especially thiamin, is pathologically characterized by myelin sheath degenerations, axis cylinder involvement in more advanced cases, and the absence of inflammatory changes. Its incidence in chronic alcoholics is reported as from 16 to 23 per cent. After several weeks of premonitory symptoms of vitamin B deficiency, often resembling neurasthenia, and accompanied by anorexia, weight loss, constipation or diarrhea, generalized weakness, backache,

palpitation, dyspnoea, precordial distress, insomnia, irritability, and headache, the neuropathy appears, usually insidiously. Calf tenderness, leg weakness, and paresthesias appear early, together with hyperesthesia and burning of the soles. Earliest weaknesses generally involve dorsiflexion of the toes and feet, eventuating in foot drop. Sensory changes include decrease to absence of vibratory and position sense. Later, complete anesthesia of the involved parts occurs, involving the lower extremities usually, though in severe cases, upper extremities may also be involved. Sensory changes usually precede motor changes. Tendon reflexes, sometimes at an early stage hyperactive, ultimately decrease and disappear.

Other central nervous system lesions usually implicate the spinal cord, producing symptoms similar to those of tabes dorsalis and combined system disease. In Marchiaflava's disease, the midzone of the corpus callosum is degenerated, and progressive personality changes, as well as varied neurologic abnormalities and convulsions occur.

Therapy consists of usual supportive measures, high caloric diets, abundant dosages of all the known B vitamins, as well as vitamins B and C. In the neuropathies, in addition, thiamin chloride in doses of 20 to 100 mg. daily are required. In Wernicke's syndrome and in nicotinic acid deficiency encephalopathy, supplemental doses of nicotinic acid, from 500 to 1,000 mg. daily are provided. Physiotherapy measures to counteract the results of peripheral neuropathy are advocated. 48 references.—*Author's abstract.*

BIOCHEMICAL, ENDOCRINOLOGIC AND METABOLIC ASPECTS

3. *Studies in Responsivity of the Adrenal Cortex in Schizophrenia.* ROBERT DICKES, GERALD H. FLAMM, WENDELL BOWMAN, EDWARD E. HOLLANDER, AND HOWARD W. POTTER, Brooklyn, New York. Am. J. Psychiat. *110*:124–129, August 1953.

Eleven female schizophrenic patients under the age of 40 years were selected for the first portion of this study. These patients had been hospitalized at least two and a half years. Patients were studied on two successive days, on the first of which saline was given and on the second of which 25 mg. of ACTH was given. Eosinophile and lymphocyte counts were followed at hourly intervals for four hours. In association with the above study, a group of 11 schizophrenic subjects, all male and under the age of 40 years, was studied. These were fairly acute patients who were hospitalized for the first time. A five-day experiment was performed, the first day of which was utilized as a control period. On the succeeding two days 75 mg. of ACTH was given daily. On the final two days of the experiment no ACTH was given. Twenty-four hour urine collections were made daily, and the accuracy of these collections were validated by measuring the 24 hour output of creatinine. The outputs of 17-ketosteroids and corticosteroids were determined. Three normal subjects were studied in the same manner. The results on the 11 chronically hospitalized schizophrenic patients showed wide variations in the hourly eosinophile and lymphocyte counts after the injections of both saline and ACTH. The

response was such that the variation could be said to fall within the normal range. Studies of the 17-ketosteroids and corticosteroids excretion of ACTH in the cases of acute schizophrenia also showed varying responses, some of which were well within the normal range. 24 references. 4 figures. 1 table.—*Author's abstract.*

CLINICAL PSYCHIATRY

For Reference Only.

4. *The Psychiatric Patient in America.* A. BALFOUR SCLARE. J. Ment. Sc. *99*:572–579, July 1953. 6 references.

5. *Psychotic Reactions Induced by Corticotropin (ACTH) and Cortisone.* GILBERT H. GLASER, New Haven, Conn. Psychosom. Med. *15*:280–291, July-August 1953.

Psychotic reactions were caused by cortisone or corticotropin in 11 patients receiving hormone therapy for: rheumatoid arthritis (4 patients), multiple sclerosis (2 patients), dermatomyositis, myxedema secondary to chronic thyroiditis, uveitis, myasthenia gravis, and amyotrophic lateral sclerosis (1 patient each). Five patients (3 rheumatoid arthritis, 1 multiple sclerosis, 1 uveitis) received cortisone; 1 patient with rheumatoid arthritis received both hormones; the rest were given corticotropin. The psychotic reactions were of two major patterns: (1) an affective disorder, either manic or depressive; and (2) more frequently, an organic reaction (toxic psychosis) with associated paranoid-hallucinatory and/or affective (usually depressive) components.

No consistent correlation was noted with regard to dosage and onset, duration, or type of psychosis. Only one of the patients had shown psychotic trends before hormone therapy. Suicidal tendencies were present in several patients during the hormone-induced psychosis (one had made a suicidal attempt before treatment). The development of frank psychosis was usually preceded by insomnia and irritability. Electroencephalographic changes were noted in 4 of the 8 patients tested.

After hormone therapy was discontinued, termination of the psychosis occurred spontaneously in the organic reactions, but the affective disorders required electroconvulsive therapy. The 11 cases of psychosis occurred among about 200 patients treated with hormone for various diseases at Presbyterian Hospital from 1949 to 1951. The author believes the incidence of psychotic reactions in patients receiving cortisone and corticotropin is about 5 per cent.

A review was made of 33 cases of Cushing's syndrome seen at Presbyterian Hospital since 1932; severe psychotic reactions occurred in 7 of these patients (21 per cent). "On a descriptive level . . . the psychotic states which occur in Cushing's syndrome resemble to a remarkable extent certain of the psychotic reactions which are induced by ACTH and cortisone. This seems to indicate that certain physiological factors in the hyperadrenal state produce alterations in cerebral function predisposing to psychosis."

The psychotic potentialities of the disease being treated must be considered in the interpretation of psychoses induced by cortisone and corticotropin. For example: psychosis frequently occurs in myxedema; pre-existing brain lesions in neurologic disorders (e.g., multiple sclerosis, amyotrophic lateral sclerosis) and lupus erythematosus may predispose or contribute to hormone-induced psychosis; arthritic symptoms may be utilized by patients as a defense mechanism against psychotic disorganization. 26 references. 2 tables.—*Author's abstract.*

6. *"Combat Fatigue" or Death Anxiety Neurosis.* JOSEPH D. TEICHER, Los Angeles, Calif. J. Nerv. & Ment. Dis. *117*:234–243, March 1953.

The diagnostic term "combat fatigue" is re-examined, illustrating from the writing of different workers the disagreement as to the criteria for the diagnosis of the disorder and its dynamics.

"War neuroses" are neurotic forms of the fear of death. The sufferers are afraid to die and afraid to kill; in their illness they avoid death and murder. Their fear is overcharged with guilt for a fantasied murder in the past, in the period of the Oedipus complex. In the resolution of the Oedipus complex the child feels guilty not only because he wishes for the forbidden mother, but primarily because of his murderous hatred for the powerful father whom he fears. He escapes both death and murder by his illness, but not the fear of either, the precipitate of the Oedipus complex.

The structure of "war neuroses" is actually more complex than this; however, the guilt and fear of death precipitated by the Oedipal situation are the fundamental pillars of the condition. Psychoanalysts studying neuroses precipitated by war have pointed out that the structure of these neuroses consists of conversion hysteria manifestations (anxiety converted into somatic symptoms); the traumatic element proper (breakdown of protective apparatus against stimuli and the attempt to build it up again) expressed in the repetitive catastrophic nightmare and startle reaction; manifestations of reactivated anxiety and guilt, and defenses against this anxiety; and manifestations of ego conflicts, the fear experienced by the ego lest the superego abandon it. It is suggested that the "war neuroses" might be more cogently described by the term "death anxiety neuroses." 9 references.—*Author's abstract.*

7. *Recognizing Emotional Problems in Adolescent Girls.* CARL L. KLINE, Milwaukee, Wisconsin. Wisconsin M. J. *52*:482–486, September 1953.

Because of the normal variations in behavior during the adolescent period, it is sometimes difficult to evaluate the significance of emotional problems appearing in this age group. The incidence of significant emotional problems or illness in this age group has not been adequately studied. In a one year survey of 2,250 college women the writer found that 22.7 per cent manifested some kind of significant emotional disturbance during the year.

The recognition of emotional illness in adolescent girls is important because of the immediate and the long term implications of such illness. Adolescent girls will often first show evidence of beginning symptomatic emotional illness by difficulties in one or more of these four areas: (1) scholastic, (2) social, (3) physical and (4) discipline. Each of these areas is discussed in the paper.

In considering indications for treatment it is emphasized that each patient must be considered as an individual since an accurate evaluation of the total person must always precede any recommendation for treatment. A guide list of symptoms which are often significant is given. Treatment must be highly individualized, and the treatment of choice is psychotherapy based upon a psychoanalytical orientation. Girls in this age group are generally well motivated for treatment and usually do well. This is particularly true in the later adolescent. Girls in the early adolescent period often present many difficulties in treatment.—*Author's abstract.*

8. *Suicidal Incidents in Military Personnel.* HARRY POZNER. Brit. J. M. Psychol. *26*:93–109, June 1953.

The study of military history reveals that suicide has always been a recognized hazard of the soldier's life, that legislation to deter would-be suicides has long been part of the military penal code, and that the number of suicidal incidents in any army is related to its state of morale and the degree of social integration in the country of which it is a part.

From a detailed investigation of 60 British service men and women involved in suicidal situations in an English military command, the author concludes that these personnel can be divided into four main groups: (1.) those suffering from suicidal ruminations, preoccupations, and obsessions with chronic anxiety and fears of insanity; (2.) those who made genuine attempts on their lives but were not necessarily psychiatrically ill; (3.) those immature, hysterical, or psychopathic individuals who made dramatic but ineffectual suicidal gestures, which were never intended to end in self-destruction; and (4.) those who used suicidal threats as a form of moral blackmail.

In most cases the military environment was the significant factor in the suicidal setting. Officers in the older age groups constituted the most serious suicidal risks, but the greatest number of suicidal incidents was observed in young recruits in their first six months of service. Six (10 per cent) of the total patients were considered to be psychotic, 24 (40 per cent) were diagnosed as psychopathic personalities, and nine (15 per cent) were found to be free of any psychiatric disorder. Nineteen (31.7 per cent) were placed under special hospital supervision. In men, the specific suicidal situation was precipitated by fear, frustration or aggression, whereas women were more affected by loneliness, humiliation, or the loss of love-objects. The method of choice depended upon opportunity and the access to means of self-injury, but in the largest group, those whose reactions to life stresses were basically inadequate, the commonest method was the self-administration of analgesic or sedative drugs, or the tentative slashing of throats and wrists. In view of the disciplinary aspects and the problem of disposal in the army it was important to

ascertain the true degree of suicidal intent in any individual patient. The assessment of genuine suicidal risk could be based on the presence of depression with feelings of guilt and unworthiness, gross anxiety and perplexity, irritability, agitation, insomnia and loss of weight, hallucinations and bizarre delusions, unpredictable and aggressive behavior, and a history of previous genuine suicidal attempts or tendencies. An attempt at suicide does not preclude a soldier from further service, and it is the responsibility of the military psychiatrist to decide whether the patient should be returned to full or restricted employment, to be treated in hospital, or to be medically discharged as temperamentally unsuitable for any form of military duty. A suicidal act by a soldier in detention or awaiting disciplinary action constitutes a special problem, and in the author's opinion very few of these incidents involve any true degree of suicidal intent. Only in the most exceptional or psychiatrically clear-cut cases should the suicidal incident be allowed to interfere with the course of disciplinary procedure.

Accident-proneness, reckless behavior, a deliberate disregard of genuine organic illness, chronic alcoholism, peculation, and acquired perversion reveal aspects of concealed and professional suicide particularly in the officer class. The prevention of suicidal incidents in military personnel depends upon raising the general state of morale by due attention to the efficient selection of recruits, improving the conditions of service, pay and status within the army, providing security for the soldier's family, and by the choice of stable and competent officers for staff and command appointments. 22 references. 7 tables.—*Author's abstract.*

GERIATRICS

9. *Fractures of the Hip in Elderly Psychiatric Patients.* JANE E. OLTMAN AND SAMUEL FRIEDMAN, Newton, Conn. Geriatrics. *8*:434–441, August 1953.

Fracture of the hip is a fairly common injury in elderly psychiatric patients. An analysis of 214 fractures of the hip indicated a much greater incidence in women than in men, in the ratio of 2.5:1. With respect to age, the peak incidence occurred during the eighth decade in both sexes; however, there was a definite tendency for these fractures to occur at an earlier age in males. Nailing under low spinal anesthesia appeared to be the most desirable method of treatment. The outcome in this group of psychotic patients was less favorable than in normal individuals. Significant prognostic features were: age, sex, type of fracture, and presence of other physical complications. Mortality was directly related to the age of the patient; it was highest in octogenarians. The mortality among males was higher than that of females for each age period. Intertrochanteric fractures were much more serious than intracapsular fractures. There was a high incidence of physical complications and degenerative conditions, particularly of the cardiovascular system, in this group of patients. Post-operative care was difficult because of the frequency of marked confusion, inability to cooperate, and unsatisfactory toilet habits. Caution was necessary with respect to early initiation of motor activities and ambulation. Autopsy material indicated that pulmonary embolus was a fre-

quent cause of death during the first month postoperatively. 5 references. 5 tables.—*Author's abstract.*

10. *Studies on the Process of Aging.* ALBERT J. SILVERMAN, EWALD W. BUSSE, ROBERT H. BARNES, LAURENCE L. FROST AND MARGARET B. THALER, Denver, Colo. Geriatrics. *8*:370–376, July 1953.

A group of 140 patients over the age of 60 were studied from the following different aspects: (1.) complete physical and neurologic examinations; (2.) medical and social histories; (3.) psychiatric evaluation; (4.) a battery of psychological tests; (5.) electroencephalograms; (6.) critical flicker fusion frequency for light; (7.) laboratory tests including urinalysis and blood studies—(NPN, serology, blood sugar, CBC, Hb).

An analysis of electroencephalographic records reveals that in spite of the allowance of many records as normal, which in younger people would be considered disturbed, our old age series still had many more abnormalities than a younger control group. This was particularly interesting since our community group (84 patients) had a high incidence of pure focal temporal abnormalities which did not seem to affect their functioning. This finding was confirmed by psychologic testing in which it was noted that this focal group functioned as well psychologically as did the normal EEG group.

Careful clinical judgment is needed in order to evaluate the significance of an electrical temporal focus in elderly people. The presence of a focus in patients over 60 years should not be taken alone as a definite suggestion of an expanding lesion.

Fifty-six senile patients showed more electroencephalographic disturbances than did the community group; diffuse and mixed records appeared to predominate in the senile group. This also correlated well with psychologic data which revealed the grossest deficiencies in psychic functioning in the diffuse and mixed groups.

The problem of what makes a person a senile psychotic has by no means been answered. Electroencephalographic evidence of diffuse dysrhythmia of the brain does not correlate with impaired psychic functioning. But beyond this lies the largely unexplored area of why some people seem to get along in society even though they have localized electroencephalographic evidence of brain disturbance.

The importance of psychosocial factors must not be underestimated, for even though brain damage may be irreversible, the contributing emotional factors might be avoided or alleviated with appropriate treatment in early life, and thus help to reduce the ever-increasing problem of mental illness in the aged. 7 references. 5 figures. 1 table.—*Author's abstract.*

HEREDITY, EUGENICS AND CONSTITUTION

11. *The Importance of Constitution in Psychiatry.* G. LANGFELDT, Oslo, Norway. Am. J. Psychiat. *110*:261–268, October 1953.

The author, who has the chair of Psychiatry at the University of Oslo, Norway, points in this article to a topic in clinical psychiatry, which to some degree seems

to be neglected in American psychiatry. The constitution of an individual is defined as the total psychobiological outfit of a personality that, because of inherited and external factors, has been stabilized to such a degree that it can be changed only by severe psychic or physical influences. Hereditary investigations, normal characterology, and clinical experiences properly described in the article speak strongly in favor of the existence of well defined types of constitution that play an important role in pathology and criminology. The constitutional types most frequently met in clinical psychiatry are the sensitive, (in details described in the book of the author: *The Hypersensitive Mind in Normals, Neurotics, Psychopaths and Psycholics*, E. Munksgaard, Copenhagen, Denmark, 1952), the cyclothymic and schizoid, the hysterical, the compulsive, and the paranoic and paranoid constitutions. A common trait in all these constitutional types is the disposition to neurotic as well as psychotic reactions which can be understood either as exaggeration of the character traits in question or by assumption of the relatively simple psychodynamic processes of introjection, conversion, or projection. It is important to try to diagnose and differentiate the constitutional types. This enables us to understand the personality itself as well as the pathological reactions. —*Author's abstract.*

PSYCHIATRY OF CHILDHOOD

12. *The Dangers of Codeine Overdosage in Children.* MAX J. FOX, Milwaukee, Wisconsin AND EARL JOCHIMSEN, Madison, Wisconsin. Wisconsin M. J. *52*: 487–498, September 1953.

A brief discussion of the pharmacology of codeine is presented with a comparison to the actions of morphine. Three cases of codeine intoxication with respiratory depression are reported in children with measles. The anatomy of the cough reflex is described and its importance emphasized as a danger signal of oncoming encephalitis in measles. The differential diagnosis of measles encephalitis and codeine poisoning may be difficult, and their identical clinical pictures should be borne in mind.

The dangers of overdosage with codeine in small children are pointed out. The physician's duty is to see that the parents recognize these dangers and do not use codeine mixtures as a routine family remedy. 5 references. 1 figure.—*Author's abstract.*

PSYCHIATRY AND GENERAL MEDICINE

13. *In-Patient Care of General Hospital Psychiatric Patients.* R. W. CROCKET. Brit. M. J. 122–125. July 1953.

An analysis is given of 500 consecutive patients seen for diagnosis or treatment in the Department of Psychiatry at Leeds University and the General Infirmary at Leeds, England. Fifty-seven of these patients were admitted to psychiatric beds in the general hospital, being treated under conditions no different from those ap-

plying to any other type of illness. The following reasons for admission could be discerned:

Admission for physical investigation. There is at times a quality in the psychiatric relationship which works against intensive physical investigation. The psychiatrist is trained to be passive and permissive, whereas the medical physician and surgeon must be active and aggressive in attacking the physical problems of the patient. This suggests that the technics of team work between the psychiatrist and the general physician should be more explicitly explored.

Admission for observation. Many patients require observation for adequate assessment. There is a psychotherapeutic advantage in arranging a special hospital routine for such patients. Such a routine will vary with the circumstances. Six stages are quoted: phase of admission and preparation of the patient; initial rest in bed and physical investigation; patient up and about the ward in a dressing gown, with some occupational therapy away from the ward; the patient dressing and coming for interviews in the psychiatric department, separate from the hospital; short walks or shopping expeditions with relatives, while still in hospital; finally a period in an ordinary convalescent home away from psychiatric supervision.

Admission for specific treatment. Specific psychiatric treatment can be profitably fitted in to such a routine, including psychotherapy, hypnosis, narco-analysis, E.C.T., abreaction, modified insulin and drug therapies. It is useful that with short-acting relaxants E.C.T. can now be carried out in the general ward behind screens.

Escape from environmental stress. It may be a valuable initial step to relieve stress by admission, even though the patient will have to face his difficulties again shortly. A special case is the patient who turns up as a casualty and who can be admitted for 24 to 72 hours. Social dynamics begin to work, and with the aid of a psychiatric social worker urgent problems become more quickly clarified. Sometimes environmental factors obscure diagnoses of prognosis and admission is then a diagnostic aid.

Establishing psychotherapeutic rapport; transferral from other beds; admission from distance. These are all mainly matters of convenience. Psychotherapy in the general hospital is rarely indicated, except as a supplement to attention which the patient may have received from the general physician or surgeon, and even then it is less generally effective.

In Great Britain there are no statistics available to show how many psychiatric beds are provided for patients in the general hospitals, apart from observation ward beds. A joint memorandum of the Royal College of Physicians of London, the British Medical Association, and the Royal Medico-Psychological Association in 1945 suggested that 5 per cent should be available where a psychiatric outpatient clinic is held. There has been a decided broadening of interest on the part of the psychiatrist to include psychosomatic and neurotic problems in addition to psychotic. The question has to be faced whether the general hospital can in fact play a useful part in relieving the mental hospital from some of its present load. It is suggested that an experiment might be made whereby beds in a progressive general

hospital could be alloted to a mental hospital, admission to be only through the mental hospital. By this means one could discover, first, how many patients can be treated successfully in a general hospital who are at present treated successfully in a mental hospital, and, secondly, what special administrative arrangements and regimes would be necessary. A development of this kind might be a powerful influence in encouraging further integration of psychologic and physical medicine. 7 references. 1 table.—*Author's abstract.*

13. *Changes in the Blood during Emotion* (*Sur les modifications sanguines pendant l'émotion*). A. F. HALMOSH. Encéphale. *42*:250–272, No. 3, 1953.

A study of the leukocyte count was made in 63 medical students just before and immediately after examinations. Only a variation of more than 30 per cent in the leukocyte count (or of 1,500 leukocytes or more) was considered to be of significance; in 29.88 per cent of the 94 leukocyte counts made on the 63 subjects, there was a variation of more than 30 per cent in the count, and in 42.55 per cent, there was a variation of 1,500 leukocytes or more. An examination that was difficult caused an intensification of emotion at the time of the examination wh ch was accompanied by an increase in the leukocytes; after the examination, a feeling of calm and satisfaction on the part of the student resulted in a fall of the leukocyte count. But in the case of a significant fall in the leukocyte count and a high initial count, the law of Wilder might be applicable, i.e., that an exciting stimulus to an organ already in a state of excitation produces an inhibition. In a few cases a study of the electrolytes of the blood was made, but not a sufficient number of specimens were obtainable for this purpose to lead to definite conclusions. 3 figures. 5 tables. 27 references.

14. *Anxiety States in General Practice.* R. F. TREDGOLD, London, England. Lancet. *II*:409–411, Aug. 29, 1953.

Prevalent foci of anxiety are described; in particu'ar the symptoms such as inability to concentrate, which set up a vicious circle, and fears of illness which are often allowed to linger in patients because they lack either reassurance or explanation, or because they do not understand what is said. The hospital atmosphere is itself highly suggestive. Other factors in the environment, such as domestic, employment, financial, group, and housing problems are often unalterable, but the patient's attitude to them *can* be modified, and it is this attitude which affects his mental health.

The relatives must be called in to collaborate, for their influence is exerted far longer than the doctor's, and they cannot remain neutral. Conflicting emotions between relative and patient may be due to conflicting interests, but more often to ignorance.

The doctor should realize that the nurse is often shy of proffering information or advice to him. Nurses are seldom encouraged to voice their opinions; the doctor must clearly reveal that they are always acceptable, for she is often in closer contact with the patient and sees him more at ease.

The general practitioner, the consultant, and even the psychiatrist are subject to anxiety states. These may result from their mutual relations. The psychiatrist cannot tell how interested or expert in psychiatry is the general practitioner, and so is in doubt as to how much he can ask the general practitioner to do. Two extreme schools of thought exist among general practitioners—one, that the psychoneurotic patient is worth helping, the other that he is a nuisance. It would assist the psychiatrist to know which school the general practitioner represents. In the present pressure of work, one must stop and decide what can be done and what cannot be done for any given patient. If conscientiousness makes one feel indispensable, this is a delusion and a good holiday is indicated. 1 reference.—*Author's abstract.*

TREATMENT

a. general psychiatric therapy

16. *A Plan for Rehabilitating Improved Psycholic Patients.* FREDERICK SCHNADT, Fort Lyon, Colo. Am. J. Psychiat. *110*:253–260, October 1953.

Consideration is given to the problem of improved psychotic patients who, though able to achieve and maintain a privileged status in hospitals over a period of years, have no adequate avenue available whereby their ful rehabilitation may be accomplished. A plan is suggested, involving an intermediate step between hospitalization and discharge, which would serve to prepare long-term neuropsychiatric patients to engage in extramural occupational activities and to adjust in society.

The intermediate step suggested is that of a Re-education Center, a combination of a business establishment and an organization for meeting patient's emotional needs. Emphasis is placed upon work, the pressure of which is increased as the patient is able to accept such pressure, with the work load geared to the patient's capacities to produce and progress. Three methods of disposition of articles are discussed.

Management of the Center would be twofold: Aspects involving personality adjustment would be directed by psychiatrically oriented persons; the business plant would be under the direction of an administrator who had experience in industry. In addition to psychiatric and psychologic staff, skilled work supervisors with some knowledge of mental illness would train patients occupationally. The aspect of work as such being beneficial to patients is considered important. Patients would be paid a wage for their work, and their possibilities for advancement and promotion would be made clear.

Psychotherapeutic activities of various kinds would be integrated with Center activities. Group psychotherapy is felt to be of great potential value in such a setting. Patients would live first at the Center, and later, if suitable, in the adjacent community. Families of patients would be encouraged, at a feasible time, to come to the community, while the patient was still under the supervision of the Center. Wives might participate in Center social and psychotherapeutic activities in a limited manner. Occupationally-oriented counseling would be available to the

patient, as well as individual psychotherapy in some instances. The entire structure would be that of a group oriented in its thinking toward a patient's adjustment in society, with the emphasis upon productive work serving both as a balance wheel and a means of clarifying the patient's potentialities to himself before discharge. Methods are indicated by which a patient could be returned to the Center if necessary after an unsuccessful trial period in civilian life, and the way would be left open for the patient to return to an NP hospital if he could not adjust to the demands of the Center.

It is suggested that sponsorship of a pilot project by a philanthropic organization might best be initiated. The cost of establishing a Center is seen as relatively large, though the point is made that the cost would not be as great as that involved for a new mental hospital, which might have to be constructed instead. Concerning advantages, the old stigma in attempting to go directly from hospitalization to a job is eliminated; the whole stigma of NP hospitalization is not removed, but records of a successful work period would follow hospitalization and precede employment. The patient may more nearly pay his way in a Center. There is the possibility of helping the patient in situations of increasing pressure and tension, while supervisors still retain some control over him. Another advantage is that family life might be resumed under favorable circumstances, and that family members might gain further understanding of the patient and mental illness generally. Treatment costs would be reduced for patients transferred from hospital to Center; eventually, the rate of discharge would be influenced favorably. Much of this movement would be among patients who would otherwise remain where they are, thus preventing much of the chronicity in mental patients by offering them practicable goals to work for—a ladder one can climb and upon which concrete, perceptible advancement can be made. 6 references.—*Author's abstract.*

17. *Factors in Group Motivation in a Mental Hospital.* ROBERT W. HYDE, Boston, Mass. J. Nerv. and Ment. Dis. *117*:212–225, March 1953.

Through the application of an objective method of observation of the factors involved in ward social life it was possible to arrive at an understanding of the relations of the patient in his hospital environment to a degree necessary for the proper training and management of personnel to this end. Factors studied and found significant were the following:

Personnel were present who performed a leadership role in six of the ten situations with good socialization. Socialization was relatively independent of the number of personnel present. There appeared to be a saturation point beyond which personnel did not bring about optimal socialization, but they were effective in preventing an unsocialized ward scene.

Patients effective in promoting ward socialization (but no personnel) were present in four of the ten situations with good socialization. Of nine situations with no personnel present, five were adequately socialized. The 15 effective patients interacted with 3.2 patients and 4.0 persons (patients and personnel together) in the 15 minute observation period, more than any personnel group.

Effective Personnel and Patients: The level of ward socialization was directly related to the number of effective persons present, whether or not these persons were personnel or effective patients, rather than to the number of personnel present. Probably the most efficient use of personnel to promote ward socialization is through encouraging them to team together with the friendly outgoing patients in their work. Seven of the 15 effective patients had shown aggressive behavior which was unfavorable in its effect within 24 hours of the observation.

Quality of Personnel and Patient Interactions: The greater the number of friendly personnel-patient interactions, the greater was the proportion of patient-patient interactions which were of friendly nature.

Type of Personnel: The occupational therapist interacted with the greatest number of patients, 2.5, in the 15-minute observation period. Nurses were next (1.7 patients), and attendants least (.7 patients). Doctors interacted with 1.2 patients. This suggested the need for ward occupational therapy, for better training of attendants, and for the realization that the doctor is engaged more in individual psychotherapy than in ward sociotherapy.

Media for Socialization. Games: Twenty-seven games included no personnel as players as against eleven which included personnel, showing that games can be brought about by the patients themselves if materials are easily available. The larger the number of players, the more interest was attracted and the more watchers were drawn to the games. Games which were unusual and implemented, like monopoly, drew more watchers. Of the 15 situations where no games were being played, only one was classified as well socialized, while of the 24 situations where social games were being played, none was classified as poorly socialized.

Radio (a small radio operated by the patients) not only attracted the interest of many patients but also promoted interaction. Twenty-five per cent of those listening to the radio talked with others about things suggested by the broadcast.

Reading was seen to be an interest both to those capable of more interpersonal activity and to those who were adverse to contact with others. Approximately 15 per cent of the patients reading conversed with others about what they read. This was most apparent with those reading the newspaper, next those with magazines, and least of all, those with books.

In general, the value of studying the social life on the mental hospital ward was pointed up, together with many of the factors that are important in developing a "therapeutic community." 4 references. 4 tables.—*Author's abstract.*

b. drug therapies

For Reference

18. *Problems and Results of Pharmacotherapy in Neurology and Psychiatry* (*Probleme und Ergebnisse der Pharmakotherapie in der Neurologie und Psychiatrie*). K. H. STANDER. Fortschr. Neurol. u Psychiat. *21*:399–448, Sept. 1953. A review article. 1207 references.

19. *A Study of the Effect of Glutamic Acid on Delinquent Adult Male Mental Defectives.* ALBERT A. KURLAND AND CURTIS A. GILGASH. Am. J. Ment. Deficiency. *57*:669–680, April 1953.

Twenty-six adult, white, male mental defective patients of the forensic division of the Spring Grove State Hospital were selected. They were divided into two groups of 13 patients each. They were matched by pairs on the basis of age and I. Q. The patients were all in good health, and no attempt was made to control the type of activity engaged in by them during the experiment. They were told that the medication was a food factor whose value was being studied. They were permitted to continue with their customary hospital routines. The glutamic acid was administered in doses of ten grams three times daily for a period of 30 days.

The patients were given alternately the Wechsler Form 1 and Form 2 to avoid reduplication. They were retested following one month's (30 days) medication. They were then retested after three months had elapsed since the medication was terminated. There are seven tables dealing with the comparative scores on the I. Q. studies with a statistical analysis of the data for significant differences.

It was found that the glutamic acid did appear to have a stimulating effect on the I. Q. of the adult mental defective delinquent. This was interpreted as the result of bringing the patients' I. Q. level up to its probable maximum functioning level rather than increasing it. This was not sustained when treatment was stopped. No noticeable changes were observed in the daily social behavior of such patients by the methods used in this study. 11 references. 1 figure. 7 tables.—*Author's abstract.*

20. *Anxiety and Depressive States Treated with Isonicotinyl Hydrazide (Isoniazid).* HARRY M. SALZER AND MAX L. LURIE, Cincinnati, Ohio. Arch. Neurol. & Psychiat. *70*:317–324, September 1953.

Forty one patients ranging in age from 26 to 76 years, most of whom were suffering from depressive states and one of whom had a pure anxiety state, were treated with isoniazid. Previously most of them had received amphetamines, barbiturates, vitamins, and hormones without any improvement. Those patients with the severest depressions and those giving evidence of suicidal tendencies were omitted from this series, as they required immediate hospitalization and electric shock therapy. The optimum dosage of isoniazid was found to be 100 mg. given orally three times a day, one hour after meals. When given in this amount no undesirable side effects were noted. Some improvement was usually noted within three weeks if it occurred at all. Temporary remissions were encountered when the drug was reduced or discontinued prematurely, but in each instance the former improvement was regained when the proper dosage was resumed. Of the 41 patients treated, 28, or 68.3 per cent, improved after receiving isoniazid. There was no significant difference in the rate of improvement or in the overall results in the different types of depression. In some instances where the isoniazid failed to produce elevation of the mood, definite improvement was noted in some of the other

presenting symptoms, such as insomnia and anorexia. In one instance parenteral isoniazid produced improvement where the oral route had failed. Of the 21 patients who had required electric shock therapy for previous episodes, 13, or 59.1 per cent improved on isoniazid alone. Furthermore, the results suggested the possibility that isoniazid used in conjunction with electric shock therapy may reduce the number of treatments necessary. 8 references. 3 tables.—*Author's abstract.*

d. the shock therapies

21. *Anxiety After Electroshock Therapy in Involutional Melancholia.* THOMAS FREEMAN AND JOHN L. CAMERON. Brit. J. M. Psychol. *26*:245–261, September 1953.

This paper records some observations made in a small series of patients suffering from involutional melancholia who had failed to respond to electroshock therapy. The outstanding feature, both objectively and subjectively, was an intense degree of anxiety from which they had not previously suffered. This anxiety expressed itself in a threat not only to their inner feelings but also to the external world.

A review of the psychoanalytic theories of melancholia is given and a theory proposed to account for the presence of the extreme anxiety after electroshock. Some recommendations are made with regard to electroshock therapy.

The second part of the paper comprises a provisional report on the treatment of these patients by group psychotherapy. This therapy uses psychoanalytic insights and the report covers the first six months of the treatment. Favorable therapeutic signs were shown by two or three of the patients. 12 references.—*Author's abstract.*

22. *The Factor of Hypoxemia in Electroshock Therapy.* G. HOLMBERG, Stockholm, Sweden. Am. J. Psychiat. *110*:115–118, August 1953.

The arterial oxygen saturation in electroshock therapy was determined with the aid of a photoelectric oximeter. It was found that electroshock causes rather severe, but transitory, hypoxemia. If respiration is impaired after the convulsion, there is more severe and prolonged hypoxemia. If more than one shock is necessary to produce a convulsion, the degree of hypoxemia is considerably increased. The administration of pure oxygen for a period of one half to one minute immediately before, as well as after, the shock considerably reduces the degree of hypoxemia. After oxygen administration for one minute the hypoxemia produced by the convulsion is not more severe than that which can be produced by voluntary breath-holding. Oxygen administration prolongs convulsions and probably also increases their strength. Addition of 6 per cent carbon dioxide to the oxygen gas further prolongs convulsions, but gives a somewhat poorer protection against hypoxemia. When a muscle-relaxing agent is used and oxygen insufflated before the shock, a maximum oxygen saturation of the arterial blood can be obtained through the treatment. The convulsion is thereby greatly prolonged. 7 references. 2 figures. 2 tables.—*Author's abstract.*

23. *A Critical Evaluation of Carbon Dioxide Oxygen Inhalation Therapy in Mental Disorders.* JOHN ALFRED FRANK, New York, N. Y. Am. J. Psychiat. *110*: 93–103, August 1953.

The overall improvement rate in 238 nonpsychotic patients treated with inhalation of CO_2–O_2, collected from the literature, was 61 per cent. The highest rate (83 per cent) was reported in psychophysiologic disorders, the lowest (43 per cent) in stutterers. Carbon dioxide therapy (CDT) may shorten the duration of psychotherapy by inducing rapid abreactions in some patients. Though CDT ideally should be combined with psychotherapy, there are numerous reports of marked improvement and even "cures" with the use of CDT alone. It may be useful in patients who are hostile to psychotherapy by inducing such individuals to receive "active" treatment. CDT is of little value in psychotic reactions, hypochondriasis and severe obsessive-compulsive disorders. No fatalities or serious complications have been reported, and CDT is the least harmful somatic therapy in psychiatry at present. Various theories as to the mode of action of CDT are discussed. There is no scientific evidence that CO_2 is a "specific" agent, since many other anesthetics exert a similar effect on mentally disturbed patients. The chief contraindication to CDT is hypertensive cardiovascular disease. A major difficulty is the increasing severe anxiety aroused in some patients by the treatment. Newer technics, such as the use of nitrous-oxide induction prior to giving CO_2, are discussed. Suggestions for further research are made with emphasis on the need for adequate controls, follow-up studies, and animal experimentation. 55 references. 3 tables.—*Author's abstract.*

24. *Carbon Dioxide Inhalation Therapy.* ALBERT A. LAVERNE AND MORRIS HERMAN, New York, N. Y. Dis. Nerv. System. *14*:209–212, July 1953.

Twenty-five patients were treated with the Meduna technic of carbon dioxide inhalation therapy. This consists of administering a mixture of 30 per cent carbon dioxide and 70 per cent oxygen for 20 to 50 consecutive inhalations. Those patients who could not tolerate CO_2 were anesthetized with 100 per cent nitrous oxide prior to CO_2 inhalation.

Results: Of 20 patients representing types of cases recommended by Meduna for CO_2 therapy, 4 (20 per cent) improved. Six of this group received concurrent psychotherapy. The treated group consisted of anxiety states, conversion hysterias, alcoholic neurotic, stammerer, and homosexual neurotic. Five treated cases that Meduna does not recommend for CO_2 therapy also did not improve. These consisted of three obsessive compulsive neuroses, and two schizophrenic psychoses.

There was no significant influence on the overall results whether or not the patient had previous or concurrent psychotherapy in relation to the carbon dioxide inhalation.—*Author's abstract.*

neurology

CLINICAL NEUROLOGY

25. *Hereditary Ataxia.* JOHN W. SCHUT AND JAN A. BÖÖK. Minneapolis, Minn. Arch. Neurol. & Psychiat. *70*:169–179, August 1953.

The article describes an attempt to determine whether preclinical signs exist among individuals destined to inherit hereditary ataxia. Twenty-five individuals born to persons who had inherited ataxia from their parents were given systematic neurologic examinations and certain consistent signs of deficit were disclosed. The test "tandem stand with closed eyes" was chosen as a significant one, and it was found that 50 per cent of the individuals were unable to perform it. There were other signs of neurologic deficit among this group. The authors admit that the methods used in arriving at these conclusions were based on trial and error, and that the value of their observations will depend upon whether or not the individuals tested actually develop ataxia in the future.

Since no member of this strain showed any symptoms of ataxia past the age of 35 nor under the age of 17, the years between these ages were defined as a "risk zone." Examination of other members of the families, who had passed this age limit, disclosed some significant findings. Originally, this second group was selected for examination as a control for the persons examined within the "risk zone." However, certain members of the strain past the usual age of onset also demonstrated certain signs of neurologic deficit. Closer examination of data disclosed that it was the individuals who had affected female parents who showed the abnormalities. Also, ataxics born to an affected female parent seemed to have ataxia in a more severe form than those with affected male parents. The cause of this phenomenon was not apparent from these studies, but it influenced significantly the signs the authors could employ to select individuals destined to become ataxic, inasmuch as most group members born of a female affected parent had these static diffuse neurologic signs. Actually this is a so-called "maternal affect" which the authors feel has a bearing on the interpretation of the disease process. It seems logical to assume that even though hereditary ataxia is inherited, it ought not to be considered as superimposing itself upon a developmentally imperfect central nervous system. 3 references. 1 figure. 2 tables.—*Author's abstract.*

26. *Subarachnoid Hemorrhage of Unusual Etiology.* JOHN N. WALTON. Neurology. *3*:517–543, July 1953.

The syndrome of spontaneous subarachnoid hemorrhage usually results from rupture of an intracranial aneurysm or, less commonly, from a cerebral angioma, but occasionally it may be produced by a variety of pathologic lesions of the central nervous system.

When the hemorrhage arises intracranially, etiologic agents which occasionally may be implicated include telangiectasis, intracranial neoplasms of many types, blood dyscrasias, venous sinus thrombosis, inflammatory conditions such as meningitis, abscesses and infective emboli, focal vascular necrosis, vascular allergy, and miscellaneous factors, including pneumoencephalography and insulin or metrazol administration. Spinal subarachnoid hemorrhage is usually the result of vascular malformations of the spinal cord or meninges but can occasionally be produced by intrathecal neoplasms other than angiomas. Sometimes signs of the primary disease are evident when bleeding occurs, but often hemorrhage may be the first manifestation.

Illustrative cases of unusual etiology, comprising 5 per cent of a recently studied series of 312 consecutive cases of spontaneous subarachnoid hemorrhage, are reported and the relevant literature is reviewed.

The recognition of such cases is of importance since many of the conditions mentioned require specific treatment. Hence all possible causes should be considered in the observation of patients with subarachnoid hemorrhage. Careful clinical appraisal of each case is of the greatest importance and any unusual features in the clinical picture may indicate the need for investigations other than those commonly employed. 110 references. 2 tables.—*Author's abstract.*

28. *Ipsilateral Third Cranial Nerve Palsy as a Presenting Sign in Acute Subdural Hematoma.* E. S. CLARKE AND WILLIAM GOODDY, England. Brain. *76*:266–278. 1953.

Two cases of subdural hematoma are presented. In each of them, the only abnormal feature, apart from headache of sudden onset, was a third cranial nerve palsy which later was shown to be on the side of the clot. The first patient died, but the second recovered after operation. The diagnosis in the latter was made by angiography.

Similar cases found in the literature are reviewed, and the etiology of the third cranial nerve dysfunction is discussed: tentorial herniation seems to be the mechanism. These cases also demonstrate other phenomena due to distortion of the basal portions of the brain by supratentorial pressure.

The clinical pictures were very suggestive of an acute episode in an intracranial aneurysm, and they are compared with case 3 where a subdural hematoma was produced by a ruptured aneurysm. It is suggested that this must be considered a rare cause of subdural bleeding. In these cases, however, angiography may reveal both the lesions, and thus treatment may be instituted early. 20 references.—*Author's abstract.*

27. *The Korsakov Syndrome in Spontaneous Subarachnoid Hemorrhage.* JOHN N. WALTON. J. Ment. Sc. *99*:521–530. July 1953.

Six cases of Korsakoff's syndrome developing as a result of subarachnoid hemorrhage are reported with reference to the relevant literature. They were noted in

a survey of 312 cases of spontaneous subarachnoid bleeding, an incidence of 2 per cent. It is probable that the syndrome occurred in less overt form in many more cases.

Three cases were male and 3 female, and the patients were of ages at which subarachnoid hemorrhage commonly occurs. Two patients gave a history of alcoholism. In 1 case the mental abnormality was noted immediately after the ictus; in 2 others it appeared within 24 hours, and in the others it was delayed for between 9 and 14 days. Mental changes usually persisted for a few weeks, although in one case they lasted only 36 hours, and in another 11 months. In all cases the patients recovered mentally, although one patient has been euphoric ever since. Recovery was gradual in 4 cases, abrupt in 2.

The pathogenesis of the mental changes is discussed, and it is concluded that in these cases there was no positive evidence of a hypothalamic lesion. It seems more likely that the syndrome developed as a reaction to diffuse cerebral damage. It may be particularly likely to occur in alcoholic patients who develop subarachnoid hemorrhage, and will probably be recognized in an increasing proportion of cases of subarachnoid hemorrhage if minimal mental changes are sought with care. 42 references.—*Author's abstract.*

ANATOMY AND PHYSIOLOGY OF THE NERVOUS SYSTEM

29. *Experimental Cerebral Concussion.* ELDON L. FOLTZ, FRITZ L. JENKNER, AND ARTHUR A. WARD, Seattle, Wash. J. Neurosurg. *10*:342–352. July 1953.

Acceleration concussion was studied in cats and monkeys with continuous recording of the electric activity of cortex and certain brain stem structures, spinal fluid and blood pressures, respirations, and electrocardiograms. Purpose of the series of experiments was to obtain experimental verification of two sets of data. The first of these attempted verification of the claim that intense neuronal excitation of the brain occurs immediately following cerebral concussion and may therefore be the source of the acetylcholine which appears in the spinal fluid following cerebral concussion. The second set of data was concerned with the effects of circulating acetylcholine so produced, specifically with its possible relation to so-called cerebral swelling. This marked change in brain volume should be associated with a change in spinal fluid pressure.

Acceleration concussion was produced by means of a specially designed gas-pressure gun to administer blows to the head of the freely-suspended animal. Cortical and subcortical recording of electric activity was carried on before and during the concussion so produced. Recordings of the spinal fluid and blood pressure, as well as respiration records and electrocardiograms, were also kept. A special effort was made to reduce artifacts in the record at the time of the concussion blow. Specific criteria were used to indicate that concussion had occurred, and no animal showing anatomic damage to his skull or brain was included in the results.

In all cases the electric activity of the cortex was reduced in amplitude immediately following concussion with little change in frequency, and at times essentially no change was produced in electric activity of the cortex even though the animal was still unconscious.

At no time was any massive epileptic-like discharge observed during the first few seconds after the blow and it was thus felt that such a process cannot be the mechanism of release of the acetylcholine which appears in the spinal fluid following concussion. Changes in the electric activity of brain stem structures largely paralleled those found in the cortex, except for the activity of the medial reticular formation where consistently greater depression of amplitude was seen, as compared to the cortex. The possible role of this significant phenomenon in the genesis of coma following head injury is discussed.

No change in spinal fluid pressure greater than 10 mm. of water was recorded during the first five hours following pure concussion, though a significant rise was always present when definite anatomical damage occurred. Characteristic sharp blood pressure rise and inspiratory apnea occurred routinely at the time of concussion.—15 references. 6 figures.—*Author's abstract.*

30. *Anoxemia and Brain Disease.* CYRIL B. COURVILLE, Los Angeles, Calif. California Med. *79*:214–217. September 1953.

In this summary of the author's work in the field of cerebral anoxia he has drawn certain conclusions as to the relation of anoxemia to some of the so-called degenerative disorders of the brain. He finds a clue in the presence of areas of focal cells, areas of focal necrosis or scar formation, which are a characteristic effect of anoxemia and are similar to areas in the cortex of children with mental deficiency and cerebral palsy. When certain of the bizarre deforming lesions of the brain are found in these children upon autopsy, they are considered to have suffered from an anoxemia, probably before or during birth. This applies to the group of disorders commonly designated as mantle or nodular sclerosis (including ulegyria and microgyria), the cortical atrophies, general and hemispherical, and certain of the allied disorders of the basal ganglia, including *status marmoratus* and *status dysmyelinisatus.* The focal lesions of the cortex in the form of focal sclerosis and porencephaly are considered to be the lesions of ischemia provoked by the anoxemia, since such lesions are commonly associated with generalized dangers.

There is also reason to believe that certain of the demyelinizing disorders have similar genesis because of the close relationship of the findings in these disorders (grouped together as Schilder's disease) and the degenerative process of demyelinization found in individuals who had died weeks or months after anoxemic episodes. This change is probably to be explained on the basis of a progressive diminution of the blood supply of the cerebral centrum, which ordinarily has a poorer circulation than does the cortex.

The counter-parts of these various lesions are to be found in cases of anoxemia of later life, and when one makes an analogy between the gross and microscopic effects of anoxia and the lesions in question, the findings strongly suggest a relationship between the two.

The author further points out that with this information at hand it is possible to account for the pathogenesis of many of the other lesions associated with inflammatory and vascular diseases of the brain. 34 references.—*Author's abstract.*

31. *Effects of Aging on Cerebral Circulation and Metabolism.* P. SCHEINBERG, I. BLACKBURN, M. RICH, AND M. SASLAW, Coral Gables, Fla. Arch. Neurol. & Psychiat. *70*:77–85. July 1953.

A close statistical correlation between advancing age and decreasing cerebral blood flow and increasing cerebral vascular resistance has been found after studies on 32 normal men in various age groups, using the nitrous oxide method of determination of cerebral blood flow.

The reduction in cerebral blood flow and increase in cerebral vascular resistance are accelerated after middle age. These changes are thought to be due to increased cerebral vascular tone and vascular sclerosis.

Cerebral oxygen consumption remains fairly stable until after middle age, when it apparently begins to decrease with advancing age. This diminution is thought to result from impaired cellular function caused by reduced blood flow.

Inasmuch as the inhalation of a mixture of 10 per cent carbon dioxide and 90 per cent oxygen resulted in an increase of cerebral blood flow of more than 100 per cent in 8 of the subjects, it appears that the increased cerebral vascular resistance of the aged is not necessarily fixed. 16 references. 3 figures. 4 tables.—*Author's abstract.*

CEREBROSPINAL FLUID

32. *The Cerebrospinal Fluid Pressure.* DAVID BOWSHER, Liverpool, England. Brit. M. J. 863–865, Apr. 18, 1953; 1221–1222, May 30, 1953.

Weed and Flexner (1932) have shown the dura mater to be inelastic; it is generally accepted that at physiologic pressures liquid is incompressible, and Holbourn (1943) has shown the same to be true of the tissues of the central nervous axis. Thus, the blood vessels in the subarachnoid space are left as the only elastic tissues within the dura. In fact, comparison of the coefficients of volume elasticity of excised strips of vein and of the dural sac and its contents demonstrate them to be practically identical. It may therefore be concluded that the resting pressure of the cerebrospinal fluid is due almost entirely to the transmitted pressure from the subarachnoid veins. Some slight pressure is also transmitted from the arteries, causing the cerebrospinal fluid pressure to be slightly above that of the veins.

When the subarachnoid space is put into communication with an open manometer, fluid will rise into the tube to the height of the resting pressure. If the inferior vena cava is compressed, either by manual compression of the abdomen, or by straining, coughing etc., blood is diverted through the internal vertebral venous plexus (Batson, 1940). The pressure of the cerebrospinal fluid subsequently rises. As there is only a small total amount of cerebrospinal fluid (c. 150 cc.), if manometers of wide bone are used it may not be possible for the column to reach the

height of the new pressure, but the total volume of cerebrospinal fluid dislocated into the manometer tube is always the same.

The volume of fluid displaced must be equal to the volume by which the intradural veins have increased.

Saline infusion into the femoral vein of a recently killed animal increases the cerebrospinal fluid pressure when the abdominal vena cava is compressed, but it falls again when the compression is released. Of greater importance is the fact that retrograde saline infusion into the azygos vein of the recently killed animal causes a marked increase of cerebrospinal fluid pressure (12.0 to 15.5 cm. in a dog). It is suggested that the rise in intrathoracic pressure with expiration compresses the azygos vein and thus causes the respiratory variation in cerebrospinal fluid pressure. This is further proved by the fact that the variation disappears when the chest is open. 6 references.—*Author's abstract.*

CONVULSIVE DISORDERS

33. *Results of Intensive (Narcosis) and Standard Medical Treatment of Epilepsy.* TRACY J. PUTNAM AND SANFORD F. ROTHENBERG, Beverly Hills, Calif. J.A.M.A. *152*:1400–1406, Aug. 8, 1953.

Since the introduction of diphenylhydantoin (phenytoin) as an anticonvulsant by one of the authors in 1937 (later assisted by Merritt), a long series of drugs with similar action has been introduced. It has become standard practice to attempt to pick out one or several of these in the treatment of epileptic patients, and an attempt is made to systematize administration of them according to the following empiric rules.

(1.) Relatively well-known and nontoxic drugs should be preferred to dangerous or untried ones.

(2.) Newer drugs should be substituted for more familiar ones only with clear cause. The authors regard phenytoin as the most widely successful and safest and employ it first in untreated cases, regardless of type of seizure. Phenobarbital is their standard second choice.

(3.) The dosage of each medication employed should be increased gradually until symptoms of overdosage are elicited, then reduced slightly. Apparently the effective dose is close to the toxic dose in all drugs in the series. Amphetamine is useful in combatting the drowsiness produced by phenobarbital. Toxic rashes and leukopenia have apparently been controlled by use of cortisone.

(4.) Unless a medication under trial is clearly toxic or useless, its employment should be continued until the next drug to be tried is being given in reasonable doses.

(5.) The policy of increasing the dosage of each drug to tolerance, adding new ones to the dosage if the old are inadequate and gradually discarding those which are obviously ineffective or deleterious, should be continued until the seizures are under control or until substantially all available drugs have been tried.

(6.) The use of phenobarbital, and probably also of mesantoin, is usually to be avoided if spike and dome or "psychomotor" complexes are present in the electroencephalogram or in the presence of definite typical petit mal, dullness or psychomotor manifestations. The use of trimethadione, paramethadione, or glutamic acid is to be avoided unless some or all of these symptoms are present, and it should usually be accompanied by a maximum tolerated dose of one of the hydantoins.

(7.) Phenytoin, pushed to tolerance, is the first choice in cases where psychomotor phenomena or periodic dullness are present. Glutamic acid, the diones, and amphetamine may be tried. The patient should take vigorous exercise.

(8.) Patients should in general be instructed to report if any seizures occur, and medication should then ordinarily be increased or a new drug added. Some tolerance may develop.

(9.) The employment of adjuvants such as vigorous exercise, avoidance of strain, fatigue, and other deleterious activities, and the use of simple psychotherapy is almost always advisable. Extreme moderation in the use of alcohol is mandatory.

(10.) Surgical measures should be considered only when all medical measures have been exhausted, and when there is clear evidence of an operable focal lesion.

The use of this "standard" treatment in 75 unselected cases was successful in keeping 56 per cent of them seizure free.—*Author's abstract.*

DEGENERATIVE DISEASES OF THE NERVOUS SYSTEM

34. *Multiple Sclerosis: Its Frequency and Distribution.* LEONARD T. KURLAND AND H. J. DODGE. Neurology. *3*:577–585. August 1953.

A survey of all diagnosed cases of multiple sclerosis in Denver, Colo., was conducted in 1949 and 1950. All hospital, clinic, and death certificate reports for the previous ten years were abstracted, and all physicians were asked to supply data on patients they had seen in the previous five years. The results were compared with those of similar surveys conducted in Winnipeg, Boston, and New Orleans.

A total of 256 patients were reported in Denver. Of these, 189 were found to be acceptable as probable cases, and 154 were known to be living in Denver on January 1, 1949. The prevalence ratio as of that date for the total white population was 38.2 per 100,000 per year. (The results in Winnipeg were 41.8, in Boston 41.3, and in New Orleans 12.9.)

The average annual incidence rate in Denver was 2.3 per 100,000 population per year. It was higher for females than for males.

The greater prevalence ratio and incidence rate for females in Denver are similar to those noted in New Orleans, Boston, and Winnipeg. However, part of this difference is probably due to the tendency of women to seek medical care for neurologic symptoms at an earlier date than men.

The average annual mortality rate in Denver (0.42 per 100,000 population per year) is between that for New Orleans (0.23) and those for Boston (1.17) and Winnipeg (0.93). Reasons are stated why the authors believe the mortality rates in Denver should be similar to those in Winnipeg and New Orleans. 3 references. 4 figures. 5 tables.—*Author's abstract.*

35. *Management of Psychiatric Patients with Abnormal Electroencephalograms.* IRVING PINE AND MILTON M. PARKER, Columbus, O. South. M. J. *46*:645–650. July 1953.

Electroencephalograms taken in the study of psychiatric patients at times reveal an abnormal wave pattern. In the present state of our knowledge, the important factors in evaluating an electroencephalographic abnormality are: (a) tension effect, (b) drug effect, (c) paroxysmal activity, (d) organic lesions, (e) unknowns of neurophysiology, and (f) mixtures of the foregoing. Repeat electroencephalograms at weekly or ten day intervals where nonspecific abnormalities occur will aid in ruling out tension and drug effects. The value of this procedure is necessitated by the frequent abuse of various drugs, barbiturates, alcohol, bromide, and opiates.

If local lesions are excluded, then paroxysmal discharges are most important for the medical management of the patients, from an electroencephalographic viewpoint. In this regard it often will be necessary to use psychotherapy as well as antiepileptic medication. Two illustrative case histories of patients with electroencephalograms showing paroxysmal discharges are described.

One should proceed with caution in treating patients whose electroencephalographic record shows nonspecific abnormal brain wave patterns with antiepileptic medication, especially barbiturates or other sedatives. Three illustrative cases and a discussion of the problem are described in the article. In general, the management of the patient should proceed along the lines of problems related to interpersonal difficulties, with psychotherapy as the chief treatment of choice. Nonspecific electroencephalographic abnormalities in psychiatric patients should not be a signal to use various types of medication but rather to evaluate the total picture and to consider the relative role of psychotherapy. 5 figures.—*Author's abstract.*

36. *Studies in Myasthenia Gravis.* KERMIT E. OSSERMAN AND LAWRENCE I. KAPLAN, New York, N. Y. Arch. Neurol. & Psychiat. *70*:385–392, September 1953.

Myasthenic and cholinergic crises in myasthenia gravis are described and discussed. These crises are characterized by extreme weakness which may be due to the inherent disease or to overtreatment with anticholinesterase drugs. The clinical and pathophysiologic features of both types of crises are described. The use of 1 cc. (10 mg.) of edrophonium chloride (tensilon) given intravenously is described as a test to differentiate between myasthenic and cholinergic weakness and crisis. The optimal time to perform the tensilon test is twelve hours after the last dose of OMPA and two hours after the last dose of neostigmine. Three types of response to the tensilon test were found in this series of 12 patients with myasthenia gravis. These were: (A:) "myasthenic reaction" in inadequately treated myasthenics—increased muscle strength without fasciculations (9 patients); (B:) "adequate response"—no change in muscle strength with or without fasciculations (8 of the preceding patients after treatment); (C:) "cholinergic reaction" in overtreated

myasthenics—decreased muscle strength with or without fasciculations and severe side reactions (3 patients).

The tensilon test is rapid, performed at the bedside, and is not dangerous to the patient. 15 references.—*Author's abstract.*

37. *Congenital Absence of the Odontoid Process.* NAOMI RASKIN, Boston, Mass. Dis. Nerv. System. *14*:236–238. August 1953.

The case of a 28 year old Caucasian girl suffering from epilepsy is presented because of the rarity of the condition thought to be responsible for her epileptic seizures. The patient died *in status epilepticus.* The anatomical findings were: *conus medullaris,* congenital malformation of the skull, platybasia, congenital absence of the odontoid process of the axis, and asymmetry of the cerebral hemispheres. The left hemisphere was shorter than the right due to the small size of the left occipital lobe, which was noticeably shorter than the right. The abnormality of the base of the skull, platybasia, the absence of the odontoid process caused the malformation of the brain. Microscopic examination showed great thickening of pia-arachnoid.

The abnormal configuration of the brain and thickening of the pia-arachnoid were thought to be one of the causes of the epilepsy, the wide range of the rotation with a jolt to the brain initiating the epileptic seizure. 5 references. 1 figure.—*Author's abstract.*

38. *Progressive Neuropathic (Peroneal) Muscular Atrophy (Charcot-Marie-Tooth Disease).* ALF BRODAL, SVEIN BOYESEN, AND ARNE G. FROVIG, Oslo, Norway. Arch. Neurol. & Psychiat. *70*:1–29. July 1953.

This paper reports patients treated under the diagnosis of Charcot-Marie-Tooth's disease in the University Neurological Clinic in the years 1941–1952, in whom muscle biopsies had been taken. All cases in which the clinical diagnosis was uncertain were eliminated, leaving 14 cases with 20 biopsies. Eight of the patients were re-examined after periods of up to 11 years. Familial occurrence was present in 8 cases, and a study of two families indicates that the mode of inheritance is purely dominant.

Histologic changes differed in the muscle biopsies according to the stage of the disease process. In early stages atrophy of muscle fibers in groups is typical, but it can be found also in late stages. Increase in hypolemmal nuclei and increase in connective tissue are moderate in the beginning but augment with time. Particularly in cases of more than four years' standing degenerative changes in the sarcoplasm (granulation, vacuolation and loss of cross striations) and in nuclei (pyknosis or other changes) are conspicuous. Structurally normal but extremely atrophic fibers may, however, be seen even in long standing cases.

The histologic changes resemble those seen in amyotrophic lateral sclerosis and other disorders affecting the peripheral motor neurons, and support the contention that muscle atrophy in Charcot-Marie-Tooth's disease is due to a primary affection of peripheral motor neurons. The different features of the histologic changes are

illustrated and discussed, and the usefulness of muscle biopsies in cases of muscular atrophies is emphasized. 43 references. 26 figures.—*Author's abstract.*

DISEASES AND INJURIES OF THE SPINAL CORD AND PERIPHERAL NERVES

39. *Electric Methods in Diagnosis and Prognosis of Peripheral Nerve Injuries and Poliomyelitis.* C. B. WYNN PARRY, Chessington, England. Brain. *76*:229–265. 1953.

The paper describes an investigation into 72 cases of peripheral nerve injuries and poliomyelitis in which serial strength duration curves were plotted and electromyographic investigations made from the earliest date the injury was seen until maximal clinical recovery possible. The research was designed to answer three main questions: to what extent are these electric methods of use in foretelling recovery; how accurate a guide to functional recovery are they; and what are the relative merits of the two methods.

The present day methods of electrodiagnosis are reviewed, and the techniques of strength duration curves and electromyography described in detail.

The use of the faradic galvanic test is condemned. In nearly all cases the test was negative in the presence of clear evidence of reinnervation on the strength duration curve and electromyograph. Seventy-six per cent of the denervated muscles in this series responded to faradism and might thus have been interpreted on the theoretic basis of the faradic galvanic test as being innervated. Moreover the test is qualitative and results cannot be compared. The strength duration curve allows a quantitative expression of the excitability of the appropriate tissue and when conducted with a good stimulator and good technique is highly accurate.

The first indication of reinnervation on the strength duration curve is the appearance of a kink or discontinuity in a curve which has until then been the smooth steeply rising curve characteristic of denervated muscle.

Succeeding signs of progressive reinnervation were widening of the kink, fall in slope of the curve, and appearance of new points.

The first sign of reinnervation on the electromyograph was the appearance of short duration low amplitude polyphasic potentials. The earliest sign of reinnervation on the strength duration curve appeared on an average of six weeks before the first signs of clinical recovery, and the earliest sign on the electromyograph 8 weeks before clinical recovery.

It was found that there was a definite pattern of electric events in each of the three groups of patients: those who made good clinical recovery, fair recovery, and poor recovery.

In those patients who made good recoveries, there was a progressive increase in the number, duration and amplitude of polyphasic potentials. By four months after the first signs of reinnervation, a partial interference pattern of complex motor unit activity was seen. These changes in the electromyographic signs were paralleled by the changes in the strength duration curve of falling slope, increased points, and widening of kinks.

In those patients who made poor recoveries, long duration complex potentials were rarely seen, and a partial interference pattern was never seen. The slope of the strength duration curve remained high, and only a slight kink was seen.

In the patients that made fair recoveries, the pattern of events was intermediate between the two. The strength duration curve was arrested at the stage where there is a long flat kink with fairly low slope, and on the electromyograph long duration complex potentials were seen with or without a partial interference pattern. At no stage was a complete interference pattern seen.

In those cases that made good recoveries, some change towards normal was seen every fortnight, and if the pattern of events on the strength duration curve and electromyograph remained static over a period of six weeks, no further recovery was seen.

In six cases of poliomyelitis, complex potentials were seen. This finding is discussed in detail and a possible peripheral lesion suggested as an explanation.

It is concluded that for routine peripheral nerve injury work, serial strength duration curves are sufficient without electromyography. For diagnostic problems of lower motor neuron lesions, electromyography still remains essential.

It is suggested that a diagnostic stimulator for plotting strength duration curves deserves a place in the routine examination of peripheral nerve injuries and poliomyelitis. 14 references. 12 figures.—*Author's abstract.*

ELECTROENCEPHALOGRAPHY

40. *Ventricular Displacement and Electroencephalographic Focus in Multiple Sclerosis.* P. A. LINDSTROM, Pittsburgh, Pa. Arch. Neurol. & Psychiat. *70*: 254–259. August 1953.

Several reports of rather mild electroencephalographic abnormalities and of convulsions occurring in multiple sclerosis found in the literature were discussed. Only a few pneumoencephalographic studies have been published and the only variations from normal that they have shown are those which followed atrophy of the brain.

A case of multiple sclerosis is presented demonstrating an electroencephalographic focus and a ventricular displacement simulating those caused by brain tumor but apparently, in this patient, due to a localized swelling around an acute sclerotic plaque. When the acute symptoms of one-sided paralysis, severe dizziness and unsteadiness etc. had subsided, new studies showed that both the ventricular distortion and the electroencephalographic slow wave focus had disappeared. The patient returned to work within a few months and was still working regularly eight months after the temporary ventricular shift had occurred, although he still retained symptoms and signs which confirmed the diagnosis of multiple sclerosis. 12 references. 3 figures.—*Author's abstract.*

HEAD INJURIES

41. *Brain Injury and Extrapyramidal Diseases (Hirntrauma und extrapyramidale Erkrankungen).* W. LEONHARDT, Alzey, Germany. Fortschr. Neurol. & Psychiat. *21*:341–54. July 1953.

A review of the literature shows that brain injury has frequently been considered as a cause of extrapyramidal diseases; but this relation has rarely been demonstrated satisfactorily. In the author's own material, there are records of 2,500 cases of head injury and 66 patients with extrapyramidal diseases. In only 26 of this group of 66 patients could it be demonstrated that the brain injury was the cause of the extrapyramidal disease. The cases of extrapyramidal disease in which a brain injury was found to be the cause showed the syndrome of either Parkinson's disease or chorea. No other types of extrapyramidal disease have been found to be associated with head injury. A critical study of the reported cases shows that there is much difficulty in establishing the actual relationship between head injuries and extrapyramidal disease. The following factors should be considered in each case. (1) The family history must show absence of any hereditary tendency to any extrapyramidal disease. (2) The question whether the accident was the result of pre-existing extrapyramidal disease rather than the cause must be carefully considered. (3) The head injury must have been so severe that recognizable permanent damage to the brain would result. (4) The injury must have involved the brain stem. (5) An atypical syndrome with pyramidal tract signs is more indicative of a traumatic origin than a typical syndrome. (6) The onset of extrapyramidal symptoms in younger patients is more indicative of traumatic origin than similar symptoms in older patients. However, no definite age limit can be determined. (7) Other exogenous injuries, such as exposure to carbon monoxide, or disease, such as syphilis, must be excluded. In addition all modern methods of diagnosis, including encephalograms, must be employed in the study of all cases, in which there is a possible relationship between head injury and extrapyramidal disease. 135 references.

INFECTIOUS AND TOXIC DISEASES OF THE NERVOUS SYSTEM

42. *Follow-Up Study in Seventy-five Cases of Nonparalytic Poliomyelitis.* EUGENE MOSKOWITZ, Mt. Vernon, N. Y., AND LAWRENCE I. KAPLAN, New York, N. Y. J.A.M.A. *152*:1505–1506. Aug. 15, 1953.

Nonparalytic poliomyelitis as interpreted in this study refers to those cases showing no muscle weakness on discharge from the hospital. Each case was given multiple screenings. A total of 75 cases were examined, of which 51 were children, and 24 adults. There were 29 patients in whom muscle weakness was noted at the follow-up examination. The major segments involved were the weight-bearing muscles, principally the calf and quadriceps groups.

On discharge from the hospital there was no adequate criterion to determine the endurance and fatiguability of the weight-bearing muscle groups because the indi-

viduals were not performing their normal physical activities. There was no correlation between the duration of spasm and subsequent development of weakness. Loss or diminution of tendon reflexes was not related to the eventual onset or site of muscle weakness.

Emotional disturbances of various types were manifest in 24 per cent of the cases. In no instance was the muscle weakness extensive enough to appreciably interfere with the normal activities of the individual. The diminished work tolerance in a mildly involved muscle is apparent only after strenuous activity. The average hospital stay can be significantly reduced, provided the patient is free of spasm and has had multiple screenings. In the absence of muscle spasm and respiratory difficulties, early mobilization of the afebrile nonparalytic case has no adverse effect on the eventual functional recovery of the patient. 1 reference. 1 table.—*Author's abstract.*

NEUROPATHOLOGY

43. *Clinical Significance of Sclerosis of the Cornu Ammonis.* KEIJI SANO, Tokyo, Japan, AND NATHAN MALUMUD, San Francisco, Calif. Arch. Neurol. & Psychiat. *70*:40–53. July 1953.

The brains of 50 institutionalized epileptic patients were examined and their clinical records reviewed, with special emphasis on the presence or absence of ictal "psychic phenomena." Results are summarized as follows.

In 29 cases (58 per cent) there was sclerosis of the cornu ammonis. These cases were classified as follows: Group A, sclerosis of the cornu ammonis without other remarkable changes, 9 cases; Group B, frontal or frontotemporal traumatic lesions, in addition to sclerosis of the cornu ammonis, 9 cases; Group C, congenitally malformed brains, 11 cases. Sclerosis of the cornu ammonis was mostly unilateral in Groups A and B and bilateral in Group C. In 9 cases of Group A and in 7 cases of Group B, ictal psychic phenomena were exhibited, the prominent feature of which was confusion, often combined with rage. The incidence of emotional changes between attacks was high in these groups.

In 21 cases (42 per cent) there was no sclerosis of the cornu ammonis. These were subdivided as follows: Group A1, no cerebral changes, 5 cases; Group B1, temporal or frontotemporal traumatic lesions, 9 cases; and Group C1, malformed brains, 7 cases. Ictal psychic phenomena and emotional changes were not observed in Group A1 and were seen in only 3 cases of Group B1. The phenomenon of rage was observed in only one of the latter cases. The cases of malformed brains (Groups C and C1) were not considered in the clinical evaluation because of the severe mental changes.

The electroencephalograms obtained in a few of the cases showed a spike or sharp-wave focus predominantly in the anterior temporal region on the side of sclerosis of the cornu ammonis.

It has been observed that if there is a scar in the epileptic brain, either primary, such as one due to trauma, or secondary, due to the seizure itself, epileptogenic

foci may develop in the course of time. Since sclerosis of the cornu ammonis represents a distinct scar, one can expect, in the epileptic brain, discharging foci in the neighboring structures, most likely in the prosubiculum and adjacent parts of the sclerosed area. These parts are known to send fibers both to the temporal lobe, possibly the tip, and to the hypothalamus, through the fornix. Thus, a focus in these areas could fire the temporal tip to produce a secondary focus there, with spike activity manifested in the anterior temporal region, and it could also bombard the hypothalamus. The pathogenesis of psychomotor seizures or temporal lobe automatism developing in the course of repeated convulsions might be well explained on this basis. 40 references. 5 figures.—*Author's abstract.*

NEURORADIOLOGY

44. *Frontal Bone Hyperostosis in Psychoses.* J. NOTKIN, Poughkeepsie, N. Y. Am. J. Psychiat. *109*:929–938. June 1953.

Nine cases who offered diagnostic difficulties were found to have hyperostosis of the internal table of the frontal bone. Only one of the patients showed an increased concentration of blood calcium and blood phosphorus. Several patients showed an increase of blood cholesterol content. Obesity was not observed as a characteristic feature. One patient showed definite neurologic but no endocrine signs. None of the others showed endocrinologic changes. Five cases began with various types of functional psychosis, later showing evidence of organic mental deterioration. Four other patients had organic mental reactions from the beginning. The patients were of the female sex, an observation other workers have emphasized in their studies. 15 references. 1 table.—*Author's abstract.*

TREATMENT

45. *The Nature of Tic Douloureux. Treatment by Alcohol Block or Section of the Great Auricular Nerve.* R. WYBURN-MASON. Brit. M. J. 119–122. July 18, 1953.

Each segmental area of the skin and underlying tissues, including the trigeminal area, is not only innervated by the nerve root of that segment, but also by fibres of segments on either side. In the case of the trigeminal areas the nerve roots concerned are those forming the cervical plexus. Anatomically, the great auricular nerve which is formed by the anterior primary divisions of the second and third cervical nerve roots divides into an anterior and posterior branch, the former joining the main branch of the facial nerve in the substance of the parotid gland and the latter the posterior auricular branch of the facial nerve behind the ear. Thus, with the fibres of the facial nerve, sensory fibres derived from the great auricular nerve are conveyed into the trigeminal area. A communication from the cervical plexus joins the hypoglossal nerve and with it passes into the tongue to which it supplies sensory fibres and in which it communicates with the lingual nerve.

After alcohol block of the trigeminal ganglion or surgical section of the root analgesia in the trigeminal area is never complete. In cases in which this has been carried out for tic douloureux, although marked analgesia has resulted, the pain has often persisted or painless ghostlike twitchings continued, or the spasmodic sharp pain has been replaced by a constant severe aching, involving not only the trigeminal area, but the whole side of the face and head. The technic is described for alcohol block or surgical section of the great auricular nerve. This is carried out on the surface of the sternomastoid; the nerve appears at the midpoint of the posterior border of the muscle and passes obliquely upwards to the lobe of the ear. It is best-injected or cut about one inch up this line. A number of significant observations on cases of typical tic douloureux are cited. In these the pain appeared to have been transmitted by fibres in the great auricular nerve and block or section of this nerve abolished the pain. This method of treatment in ordinary cases of tic douloureux was adopted with very encouraging results. It is not applicable to pain in the tongue. Its great advantage is that the only after effect is a slight numbness of the lobe of the ear and there is no danger of unpleasant sequelae involving the eye. 7 references. 2 figures.—*Author's abstract.*

46. *Multiple Symmetrical Polyneuropathy Treated with Cortisone.* FRED PLUM, Seattle, Wash. Neurology. *3*:661–667. September 1953.

Three patients with symmetrical polyneuropathy involving all four extremities were treated with cortisone orally. One woman, who also had paralysis of face and trunk, improved promptly after starting cortisone in the seventh week of illness. Two men, both of whom apparently had developed symmetrical neuropathies as sequelae to penicillin injections, had either slow recovery or no improvement while receiving cortisone. Improvement of polyneuropathy following corticotropine or cortisone therapy appears to be but an occasional and unpredictable phenomenon, possibly only of coincidental significance. 21 references. 1 table.—*Author's abstract.*

BOOK REVIEWS

Heredity in Health and Mental Disorder. FRANZ JOSEF KALLMAN. W. W. Norton & Co., New York, 1953. Pp. 315. Price $6.00.

This volume presents the Thomas W. Salmon Memorial Lectures of 1952. The lecturer selected by the Committee for this honor is probably the outstanding world authority on the genetics of mental disease. Already a distinguished worker when he came to this country in 1936, he has, under the aegis of the New York State Psychiatric Institute, continued to prosecute his researches into a subject which has suffered from relative obscurity.

Doctor Kallman presents his material in three sections: Heredity in Relation to Mental Health (history, principles, methods and twin observations); Heredity

in Relation to Mental Disorder (psychoneurotic and delinquent forms of behavior, psychotic reaction types, convulsive and neurologic disease, and specific human vulnerabilities); and Contributions of Genetics to Mental Health Planning (contributions to clinical psychiatry, general medicine, and mental health).

The author, although thoroughly informed, is far from dogmatic. He presents effective evidence; he is reasonably convinced, for example, that schizophrenia follows a recessive type of inheritance (p. 179), and he suggests that variations in the symptoms of neurotic illness may well be related to the constitution of the individual (p. 111). He preserves throughout the truly scientific approach, and is not at all the dogmatist or evangelist.

We are indebted to Doctor Kallman, to the Salmon Committee, and to the publishers for a clear and scientific presentation of an important phase of psychiatric studies—*Winfred Overholser, M.D.*

The Normal Cerebral Angiogram. ARTHUR ECKER. Charles C Thomas, Springfield, Ill., 1953. Pp. 190. 140 figures. Price $6.50.

Since its introduction by Egaz Moniz in 1927, cerebral angiography has grown to be such an important diagnostic method that a well-illustrated treatise on the subject has long been needed. In this volume the author has amply provided us with precise data covering, in particular, the range of normal variation in the angiogram. Part one of the book is devoted to technic including a discussion of complications. Part two is entitled "Angiographic Anatomy."

The illustrations are excellent. The roentgenograms are reproduced as positives, which the author states is in the interest of superior illustration on the printed page. Two of the plates can be removed from the book in order to be viewed in a stereoscope.

Not only does the author consider the standard projections used in carotid arteriography but discusses facial views, occipital views, optic foramen views, submentovertical views, as well as vertebral arteriography.

The book is not without its faults. Nowhere in the text is the reader referred to specific illustrations. Also one must turn to a key in the front of the book in order to identify the depicted structures. However, there is a fairly complete index to text and illustrations.—*George D. Weickhault.*

The Interpersonal Theory of Psychiatry. HARRY STACK SULLIVAN, edited by HELEN SWICK PERRY AND MARY LADD GAWEL, Introduction by MABEL BLAKE COHEN. W. W. Norton Co., Inc., New York, 1953. Pp. 393. Price $5.00.

The influence of Harry Stack Sullivan on psychiatric thought was more than considerable in his lifetime and has continued practically unabated since his death. He stimulated all with whom he came in contact, especially by the spoken word. His flow of language, the richness of his concepts, and his wit made his lectures unforgettable. Fortunately, he left a few books, a number of articles, and a wealth of memoranda and notes, and this volume represents the start of a systematic compilation of his theoretical and practical observations and teachings.

The publication committee of the William Alanson White Psychiatric Foundation has done an extraordinary job of editing and presenting in orderly fashion the thoughts of Doctor Sullivan—thoughts which have had and will in every probability continue to have a significant influence on psychiatric thought.

The book is divided into four parts: Introductory Concepts, The Developmental Epochs, Patterns of Inadequate or Inappropriate Interpersonal Relations, with a final chapter entitled "Towards a Psychiatry of Peoples." An excellent introduction was written by Dr. Mabel Cohen.

The volume is a welcome addition to the literature and an enduring memorial to one of America's significant contributors to psychiatric thought.—*Winfred Overholser, M.D.*

The Psychology and Psychotherapy of Otto Rank. FAY B. KARPF, Philosophical Library, New York, 1953. Pp. v–129. Price $3.00.

The author presents a brief account of Rank's life, his role in the psychoanalytic movement, and his theories of personality and of psychotherapy. Rank's contribution to our understanding of art and education, to the development of short term psychotherapy, and to the relationship of anthropology and psychoanalysis has been so frequently neglected that such a book is timely. There is a clear presentation of Rank's struggle to free his thinking from that of the original isolated psychoanalytic group centered about Freud in Vienna in the early nineteen hundreds. Rank's concern with growth and individuation becomes understandable in terms of his own experience. It is of interest to workers in all fields of human behavior because it reflects the emergence of psychoanalysis from a purely medical setting into much broader areas of application. The weaknesses of the book lie in its emphasis on Rank's differences from Freud rather than upon a positive presentation of his theories and the lack of a critical evaluation of Rank's ideas.—*Margaret Mercer, Ph.D.*

Headache (Der Kopfschmerz). ERNEST PICHLER, Springer Verlag, Vienna, 1952. Price $6.45.

In the first part of the book the author discusses the anatomic and physiologic substrata for the pathogenesis of headache and the problem of pain in general. According to the author, headache is rarely caused by direct involvement of pain-sensitive structures of the head. He stresses the important role of the blood vessels in the phenomenon of headache. Pain receptors in the vessel walls are stimulated by stretch or pull of the wall. The construction of most arteries is such that contraction of their muscle fibres causes dilatation of the vessel. The firm wall of an actively dilated vessel is not much affected by an increased pulse amplitude. A passively dilated blood vessel, however, is stretched from within by even a relatively slight increase in the pulse wave. The author postulates that vasoconstriction, as such, does not cause headache, but may lead to pain because of local nutritional and chemical changes. He further concludes that any focal

process in the region of the head may lead to generalized headache of the vascular type through reflex action by way of vasomotor centers. A vicious circle is often formed because of referred pain (Head's Zones) and secondary vasomotor response.

Doctor Pichler describes experimental histamine headache and the effect on it of a number of mechanical measures and of drugs that modify the intracranial blood flow. The criteria evolved in these experiments are utilized for the interpretation of other types of headache.

The second part of the book deals mainly with the clinical varieties of headache and their "analysis" by methods similar to those used in the experimental histamine headache. This leads to an interpretation of the underlying process particularly as to predominant vasomotor response (vasodilator or vasoconstrictor) and to the indicated treatment.

The author concludes that the common headache is the prototype of the vasomotor headache of the vasodilator variety. He discusses migraine at some length. The migraine phenomenon is considered as a disturbance in the vegetative regulation and the migraine headache as vasodilator in type. Cervical migraine is given considerable attention. It is, in the author's opinion, usually due to osteochondrosis of the cervical spine. Irritation of the *A. vertebralis* in the narrowed foramina costotransversaria causes local pain as well as referred headache and vegetative symptoms. The posttraumatic headache is found to be chiefly due to vasomotor response (vasodilator). Arterial hypotonia and vasomotor lability is frequently observed in such cases. Headache in hypertension is more often vasodilator than vasoconstrictor in type.

The author calls attention to the beneficial results obtained in various types of headache by novocaine infiltration of superficial hyperalgesic areas. He emphasizes the therapeutic importance of circulatory stimulants in vasodilator headaches, and he considers psychotherapy useful in some cases of migraine, of posttraumatic and of habitual headache. He views headache not only as a local process, but as a general vegetative and central nervous system event with resonance of the entire personality.—*Ethel H. Friedman.*

Functional Neuroanatomy. WENDELL J. S. KRIEG, Blakiston Co., New York, 1953. Pp. 658. Price $9.00.

This excellent volume represents a revision of the first edition (1942) by the author, who is Professor of Anatomy at Northwestern University. As the title suggests, the emphasis throughout is on the functional aspects of the structures described (for example, cranial nerves, p. 60; extrapyramidal tracts, p. 333; cerebellar cortex, p. 450), a feature which greatly enhances the book's value to the medical student. The book, too, is especially rich in illustrations, many of them stereograms and "phantom" drawings by the author. There are 274 figures, and an 88 page atlas of sections (transverse and sagittal) and slice reconstructions. A laboratory guide and suggestions for further study are added.

The volume is of large octavo (10½ x 7¾ inches) size, clearly printed, and well bound. From all points of view, in short, it is a valuable addition to the literature of neuroanatomy.—*Winfred Overholser, M.D.*

Books received for review

A Speculation in Reality. IRVING F. LAUCKS. Philosophical Library, N. Y. 1953. Pp. 154. Price $3.75.

Manual of the Classified Abstract Archive of the Alcohol Literature. MACK KELLER, VERA EFRON, AND E. M. JELLINEK. Quart. J. Studies on Alcohol. New Haven, 1953. Pp. 56. Price $1.00.